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A

DIRECTORY

FOR THE NAVIGATION OF THE

NORTH PACIFIC OCEAN

WITH DESCRIPTIONS OF ITS

COASTS, ISLANDS, ETC.,

FROM

PANAMA TO BEHRING STRAIT

AND JAPAN,

ITS WINDS, CURRENTS, AND PASSAGES.



SECOND EDITION.

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PREFACE.

THE period which has elapsed since the first edition of this work appeared, has had a more important influence on the social and commercial progress of the world than any recorded in history, and in no part has this change been more evident than in the countries around the North Pacific Ocean.

Twenty years ago California was little more than the hunting ground of the Indians; its ports and chief places were only occupied by a few indolent half-breed Spaniards. British Columbia and its primeval forests had been untrodden by civilized man. Behring Sea had not then been visited by the whaling-fleet, which has since drawn such enormous treasures from its waters. Russian Tartary and its great river Amur, one of the largest in the world, were unknown. Japan was a sealed empire, and the various archipelagoes scattered over its surface, teeming with people, were only visited on rare occasions for the pearl oyster or biche-de-mar they produced. How all this is changed, the brief notices scattered throughout this book will show.

The vast extension of steam navigation by the introduction of the screw propeller; the establishment of sub-oceanic telegraphy; the development of the gold fields of Western America and Australia, and the consequent growth of the State of California; the opening of the vast empires of China and Japan to the world's commerce; the union of the Atlantic and Pacific coasts by the railway across the isthmus of Panama, and the Pacific Railway to San Francisco; the transfer to the United States of the Russian Territory in America; the more perfect organisation and development of the commerce with the islands; with innumerable other evidences of progress in all quarters, have so altered our relations with the remote countries

described in this volume, that the change is astonishing when it is considered in how short a period it has been effected.

The present work then refers to a much more important subject than was the case with the preceding edition; and, with its increase of interest, the improved knowledge of its hydrography will be found to have kept pace. As is stated in the introduction to the South Pacific Directory, 'this edition is differently arranged to the first. In that, the first part referred to the coasts, the second to the islands of the Pacific Ocean. These later editions separate the oceans by the equator, and each volume describes the area North or South of it, and is thus complete in itself, although supplementary to each other.

It is scarcely necessary to recount the steps which have been made in our knowledge of the Pacific and its coasts. Up to a very recent time the recital of each voyage was a tale of discovery and adventure. Many of them are familiar household stories. Captain *Cook's* voyage is scarcely forgotten as a narrative; yet not a century since he commenced the real work of correctly describing the Pacific. The voyages and surveys of *Vancouver*, 1791 to 1794, are still the best authority for the coasts of Alaska and British Columbia. At the same period the Spaniards had sent the well known commanders *Galiano* and *Valdez*, and also the unfortunate *Malaspina*, and his companion *Bustamente*; these are deserving of all good mention. They examined much of the Western coast of America.

Admiral *Krusenstern*, the hydrographer of the Pacific, follows next in order, and he first gave a correct notion of Japan, Okhotsk, and the adjacent parts of Asia (in 1803—1806); and, most important of all, has left an invaluable and noble work on the Pacific (1824, 1827), to which very many of the subsequent pages are indebted.

To another Russian officer, Captain *Frédéric Lutke*, we still are almost solely indebted for what we know of the inclement Sea of Behring, and of much of the Caroline Archipelago. A third, *Otto Von Kotzebue*, was sent by the Russian Government to the North Pacific in 1815—1818, and surveyed the Marshall Islands and other parts.

Of our own countrymen, in later times, the late Admiral *Frederic William Beechey*, stands prominent. His voyage in the *Blossom*, 1826—1828, is in a

PREFACE.

v

scientific point of view one of the most important. He fixed many positions on the American coast, surveyed Behring Strait, the Sandwich Islands, the Lau-chu Islands, &c. The same commander afterwards, in 1835-6, again went to the Pacific, in the *Sulphur*, but being invalided, he resigned his command to Captain, afterwards *Sir Edward Belcher*. The *Sulphur* did excellent service in reconciling many points in doubt, in surveying many other places of great importance, and adding a great fund of information to North Pacific hydrography. While the *Sulphur* was thus employed, the French frigate *La Venus*, under Captain *A. Du Petit Thouars*, in 1837-8, collected a great amount of valuable information on the whale fishery, besides surveying and determining the positions of many places.

Omitting many minor authorities, the noble work by *Von Siebold* on Japan, published by the Dutch Government, 1823-30, deserves every admiration, and is worthy of a nation. Another truly national undertaking was the *United States Exploring Expedition*, organized under Commodore *Charles Wilkes*, 1838. The works of this important surveying squadron need not to be further alluded to.

Later than this we may notice the voyage of the *Herald*, under Captain (now Admiral) *Kellett*, R.N., and his three voyages to the Arctic Sea, as chronicled by *Dr. Berthold Seemann*, 1845-51. These and many other works are duly acknowledged as our authorities.

Since the period when the foregoing voyages were undertaken, the great changes before alluded to have come over the countries bordering on the North Pacific. Commencing with Central America, we have made use of the work of Captain *De Rosencoe* of the *L'Obliquo*, on the province of Veraguas, in 1854, and of the observations of *M. De Lapelin*, of the French corvette *La Brillante*, 1852.

On the cession by treaty of the Californian territory to the United States, that Government immediately took measures (1848) to acquire a better knowledge of its coasts, and the ultimate result was the perfect directory drawn up by Assistant *Geo. Davidson*, U.S.N., from the surveys and observations of the U.S. Coast Survey in 1863, chiefly under Commanders *W. A. Bartlett*, *McArthur*, and *Jas. Alden*, U.S.N., 1848-1858. These directions,

comprised in Chapter IV. are invaluable, and embody all previous observations.

The shores of Juan de Fuca Strait were surveyed by Captain *Kellett* in 1847. Vancouver's work supplies the basis of our present knowledge of the inlets to the S.E. of it.

Vancouver's Island and the adjacent shores of the continent were admirably and minutely surveyed by the present hydrographer, Captain *G. H. Richards*, R.N., C.B., 1859—1865, assisted by several meritorious officers, of whom Captain *R. C. Mayne* and Messrs. *J. A. Bull* and *D. Pender* may be mentioned. The Vancouver Island Pilot, drawn up from the observations thus collected, forms the basis of Chapters V. and VI. It will be seen that we have added many important details from the very interesting works of *Lord Milton*, *Captain Mayne*, *Mr. Whymper*, and other adventurous and recent travellers. To the North of this Vancouver's work still remains the chief authority.

Of Alaska, the older authorities are still the chief, but of the Sitka Archipelago the Russian officers have made much better charts, published in 1848—1850, chiefly from the surveys of Capt. *Vassilieff*. Of the remainder of the territory of Alaska it is gratifying to find that our first edition is still considered to be useful, for the United States' Government have recently (in the present year) reprinted that portion as a guide for their newly acquired territory.

Proceeding to the north-west, the chief advances made in the hydrography arose out of the French and English Expeditions to China in 1854-7, and, for the new Russian possessions, their surveys of 1849—1854.

Our knowledge of Japan has greatly and rapidly improved. It may be said to have commenced with Commodore *Perry's* U.S. Expedition in 1853-4. The singular circumstances related on page 598 as to a remarkable and excellent native map, will be of great interest. It was drawn up by the astronomer *Takapasi Lakusaimon*, who destroyed himself when it was discovered that he had furnished a copy to a European resident. This has served in many parts as a basis of our knowledge, and this, with the surveys of Commanders *Ward* and *Brooker*, R.N., and especially of Commander

Charles Bullock, R.N., will appear as exact and perfect representations of the places of greatest interest.

Of the islands and archipelagoes which are dispersed over the surface of the North Pacific we cannot speak here in detail. Their positions and the descriptions of their characteristics are derived in each case frequently from many sources, which are duly stated.

To the authorities here enumerated, and to many others whose observations are distributed throughout the following pages, our especial thanks and acknowledgements are rendered.

This volume has been long delayed. Many avocations have prevented the author till now from devoting that time to it which the importance of its topics would command. However, in now offering it to the nautical world, he trusts that no source of information has been overlooked, and that the book will be found to be deserving of their confidence. It is the last of a series of six volumes bearing the Editor's name, which comprehend a description of the whole ocean-world. And thus completing his labours, he would express the gratification it has been through many years to collect and arrange the materials thus submitted.

A. G. FINDLAY.

London, September 1, 1870.

CONTENTS.

SECTION I.

PREFACE	PAGE iii
TABLE OF GEOGRAPHICAL POSITIONS	xi

SECTION II.

CHAPTER I.—THE COAST OF CENTRAL AMERICA	1—77
1. THE COAST OF NEW GRANADA: PANAMA TO POINT BURICA	5
2. Costa Rica	29
3. Nicaragua	43
4. San Salvador	63
5. Guatemala	72
CHAPTER II.—THE WEST COAST OF MEXICO, BETWEEN TEHUANTEPEC AND MAZATLAN	78—118
CHAPTER III.—THE GULF AND PENINSULA OF LOWER CALIFORNIA	119—151
CHAPTER IV.—THE COAST OF CALIFORNIA	152—214
CHAPTER V.—THE COAST OF OREGON, ETC., FROM CAPE BLANCO TO ADMIRALTY INLET	215—270

CONTENTS.

ix

	PAGE
CHAPTER VI.—VANCOUVER ISLAND, ETC.....	271—374
CHAPTER VII.—BRITISH COLUMBIA, ETC.....	375—444
CHAPTER VIII.—THE COAST OF ALASKA, FROM PORT- LAND CANAL TO THE KODIAK ARCHIPELAGO ..	445—497
CHAPTER IX.—THE ALEUTIAN ISLANDS, BEHRING SEA, ETC.....	498—549
CHAPTER X.—KAMCHATKA, OKHOTSK, AND THE KU- RILE ARCHIPELAGO	550—592
CHAPTER XI.—THE JAPANESE ARCHIPELAGO	593—688

PAGE
iii

xi

SECTION III.

THE ISLANDS OF THE NORTH PACIFIC OCEAN.....	689—693
---	---------

CHAPTER XII.—ISLANDS BETWEEN THE EQUATOR AND LAT. 10° N.	694
The Gilbert Archipelago	706
The Marshall Archipelago	718
The Caroline Archipelago	734
The Palau or Pelew Islands	770

CHAPTER XIII.—ISLANDS BETWEEN LATs. 10° AND 20° N., INCLUDING THE MARIANA OR LADRONE ISLANDS	785—817
--	---------

CHAPTER XIV.—ISLANDS TO THE NORTHWARD OF LAT. 20° N., INCLUDING THE HAWAIIAN OR SAND- WICH ISLANDS.....	818—905
---	---------

North Pacific.

b

SECTION IV.

	PAGE
CHAPTER XV.—THE PHENOMENA OF, AND DIRECTIONS FOR THE NORTH PACIFIC OCEAN	906—975
1. Winds.....	907
2. Tides, with Tide Tables	924
3. Currents.....	934
4. Magnetic Variation	952
5. Passages	953
ALPHABETICAL INDEX	977

ILLUSTRATIONS.

1. Currents of the North Pacific Ocean	To face 'Title.
2. Bay and Isthmus of Panama	page 5
3. Harbour of San Francisco.....	182
4. Strait of Juan de Fuca and Victoria Harbours.....	251
5. Hawaiian Archipelago	818
6. Winds of the North Pacific	907
7. Currents and Whaling Grounds	934
8. Magnetic Variation.....	952
9. Passages in the Pacific Ocean	954

	PAGE
.....	906—975
.....	907
.....	924
.....	934
.....	952
.....	953
.....	977

T A B L E OF THE GEOGRAPHICAL POSITIONS IN THE NORTH PACIFIC OCEAN.

.....	To face Title.
.....	page 5
.....	182
.....	251
.....	818
.....	907
.....	934
.....	952
.....	954

	Lat. North.	Long. West.	Authorities.	Page
CENTRAL AMERICA.				
Garachine Point, N.E. extreme -	8° 6' 0"	78° 21' 15"	The survey by	6
Patino Point, centre of ialet -	8° 16' 20"	78° 17' 10"	Capt. H. Kellett,	6
Darien Harbour, Graham Point -	8° 28' 50"	78° 4' 40"	R.N., C.B., and	6
San José Bank, Trollope Rock -	8° 6' 40"	78° 37' 40"	Com. Jas. Wood,	6
Saboga Island, Church -	8° 37' 10"	79° 3' 10"	R.N., 1845-48.	7
Brava Point, West extreme -	8° 20' 36"	78° 24' 30"		7
Pajaros I-lands, N.W. Island -	8° 32' 20"	78° 32' 10"		7
Galera Island, centre -	8° 11' 20"	78° 45' 45"		8
Isla del Rey, extreme of Cocos Point -	8° 12' 30"	78° 53' 45"		8
Gonzales Island, Havannah Head -	8° 25' 0"	79° 5' 50"		8
San José Island, Iguana Point -	8° 18' 25"	79° 6' 30"		9
Pelado Island, centre -	8° 37' 35"	78° 41' 40"		10
Chepillo Island, the tree -	8° 56' 32"	79° 7' 0"		10
PANAMA, N.E. bastion -	8° 56' 56"	79° 31' 9"		10
Flamenco Island, North point -	8° 54' 30"	79° 30' 20"		13
Bona Island, peak -	8° 33' 35"	79° 34' 5"		15
Point Chamé, extreme -	8° 39' 0"	79° 40' 50"		15
Parita Bay, Liso Point -	8° 58' 10"	80° 20' 40"		15
Iguana Island, centre -	7° 37' 5"	79° 59' 0"		15
Cape Mula, extreme -	7° 27' 40"	79° 58' 30"		16
Los Frailes, South Rock -	7° 19' 40"	80° 7' 0"	Kellett & Wood,	16
Mariato Point, S.W. extreme -	7° 12' 0"	80° 51' 30"	1849.	17
Montijo Bay, S.W. pt. of Gobernador Id. -	7° 32' 0"	81° 12' 0"	"	17
" East point of Cebaco Island -	7° 33' 0"	80° 59' 15"	"	17
Quibo or Coiba Island, Damas Bay, water- ing place -	7° 23' 10"	81° 42' 0"	J. Wood.	18
" Hermosa or W. pt. -	7° 24' 50"	81° 53' 30"	"	18
Hicarita, South point -	7° 6' 15"	81° 48' 10"	"	19
Bahia Honda, Sentinela Island -	7° 43' 32"	81° 29' 1"	Sir E. Belcher.	19
Contreras, Brincano Island, North point -	7° 52' 0"	81° 46' 0"	Wood.	22
Port Pueblo Nuevo, Rocks of Magnetic Id. -	8° 4' 39"	81° 45' 30"	Sir E. Belcher.	24
" Perdono or Intrusa Id. -	8° 4' 54"	81° 43' 0"	De Rosencourt.	24
Secas Islands, La Bruga Rock -	7° 59' 0"	81° 57' 30"	Wood.	25
David Bay, Saino Island, South side -	8° 11' 52"	82° 12' 8"	De Rosencourt.	27
Palenque Island, Deer Island, off S.E. pt. -	8° 10' 13"	82° 13' 40"	Wood.	27
Parida Island, watering-place in Chimumo Bay -	8° 5' 50"	82° 20' 40"	"	28

TABLE OF GEOGRAPHICAL POSITIONS.

	Lat. North.	Long. West.	Authorities.	Page
Lodrones Islands, South Isle -	7 52 0	82 24 40	Kellett.	28
Montuosa, S.E. end -	7 27 35	82 13 5	"	28
Burica Point, Burica Island off it -	8 1 0	82 54 35	"	29
Gulf of Dulce, Cape Matapalo -	8 16 0	83 17 5	De Lapelin.	30
" Punta Arenitas -	8 32 0	83 16 30	"	31
Sal-si-puedes Point, S.W. extreme -	8 23 0	83 34 0	"	33
Point Llorona, extreme -	8 34 0	83 43 0	"	33
Cano Island, S.W. point -	8 39 45	83 50 20	"	33
Point Mala -	9 8 0	83 39 0	"	34
Port Herradura, lake on beach -	9 38 30	84 36 7	Sir E. Belcher.	35
Gulf of Nicoya, Blanco Island off cape -	9 32 45	85 4 10	"	35
" Caldera, hot springs -	9 54 25	84 39 0	"	36
" Pan de Azucar -	9 55 48	84 50 2	"	37
" Punta Arenas, lightho. -	9 58 50	84 45 0	"	37
Cape Velas ? -	10 13 0	85 48 0	"	39
Gorda Point -	10 31 0	85 43 30	Sir E. Belcher.	40
Port Culebra, head of port -	10 36 55	85 33 30	"	40
Point Santa Elena -	10 55 0	85 46 0	Sir E. Belcher.	42
Salinas Bay, Salinas Island -	11 2 50	85 40 45	"	42
San Juan del Sur, South bluff -	11 15 12	85 53 0	"	44
Cape Desolada -	12 21 0	86 59 0	"	47
REALEJO, Cardon Island, North point -	12 27 55	87 9 30	"	50
Fonseca, or Conchagua Gulf; Coseguina Volcano -	12 58 0	87 37 0	"	58
" Port La Union, Chicarene Point -	13 17 5	87 42 15	"	59
Port Jiquilisco, or Triunfo de los Libres -	13 22 0	88 12 0	Spanish MS.	64
River Lempa, Barra del Esp. Santo -	13 13 0	88 17 0	Lapelin.	65
Volcan de S. Miguel, 7,024 feet -	13 25 30	88 20 0	"	65
Port Libertad, flagstaff -	13 26 30	89 23 0	"	66
City of San Salvador -	13 48 0	89 4 0	"	67
Port Acajutla, or Sonsonate, Pt. Remedios -	13 34 30	89 53 10	"	68
Isalco Volcano -	13 47 0	89 33 0	"	70
Port of Istapa or Iztapam -	14 56 16	90 49 6	"	73
Volcan de Agua -	14 32 50	90 50 30	"	74
Volcan de Fuego -	14 33 0	90 59 31	"	74
San José de Guatemala, pier head -	13 53 40	90 45 0	Harvey.	75
WEST COAST OF MEXICO.				
Boca Barra, about -	16 12 0	94 45 0	Trastour.	83
La Ventosa Bay, Morro -	16 9 35	95 4 37	Bauza.	83
Bay of Bamba, Punta de Zipegua -	16 1 0	95 28 30	Masters.	85
Morro of Ystapa, or Ayuca -	15 51 56	95 43 56	Sir E. Belcher.	85
Bay of Rosario, Morro de las Salinas -	15 50 25	96 2 0	Masters.	86
Port Guatulco, islets off -	15 44 25	96 10 0	Sir E. Belcher.	89
Port Sacrificios, Sacrificios Island -	15 44 0	96 19 7	Spanish MS.	91
Puerto Angel or Port Angeles -	15 44 0	96 42 0	Bauza.	91
Alcatraz Rock -	15 58 0	97 30 0	"	91
Acapulco, Town of, Fort S. Diego -	16 15 30	99 50 0	Sir E. Belcher.	92
Paps of Coyuca -	17 6 0	100 0 0	"	96
Point Jequepa -	17 20 0	101 8 0	"	96
Morro de Patatlan -	17 32 0	101 24 0	" [1547.	96
Port Sihuantanejo, head of port -	17 38 3	101 30 52	Captain Kellett.	97
Mangrove Bluff -	17 54 5	102 12 41	G. H. Richards.	97
Paps of Tejupan -	18 20 0	103 18 0	"	98
Colima Volcano, 12,003 feet, summit -	19 24 0	103 34 0	"	100

	Lat. North.	Long. West.	Authorities.	Page
Playa Maria Bay, Sta. Maria Point -	28 55 0	114 31 0	Capt. Kollett.	148
St. Geronimo Island -	29 48 0	115 47 0	"	149
Port San Quentin, West pt. of entrance -	30 21 30	115 56 33	Sir E. Belcher.	149
Point Zuniga -	30 30 0	115 58 0	Vancouver.	150
Cenizas Island, N.W. point -	30 32 0	116 2 0	"	150
Cape Colnett, S.W. point -	30 59 0	116 15 0	"	150
Todos los Santos Cay, Point Grajero -	31 44 0	116 46 0	"	150
Los Coronados Islets, highest point 575 ft.	32 21 46	117 13 21	"	151
COAST OF CALIFORNIA.				
San Diego Bay. Initial point of boundary obelisk -	32 31 59	117 6 11	The Survey by the U.S. officers under Lieut. W. A. Bartlett, 1849;	156
" Point Loma Lighthouse -	32 40 13	117 12 22	Comm. J. Alden, 1853; and As-	157
San Luis Rey, anchorage off -	33 17 0	117 29 0	sistant Geo. Davidson, 1863.	158
San Juan Capistrano, anchorage off -	33 26 55	117 43 0	Sir E. Belcher.	158
San Pedro Bay, bluff at landing -	33 43 19	118 6 3	"	159
Point Hueneme -	34 8 0	119 9 0	"	160
Buenaventura Mission -	34 15 0	119 15 0	"	161
Santa Barbara, lighthouse -	34 23 35	119 42 5	"	162
Point Concepcion, lighthouse -	34 26 47	120 27 0	"	163
El Coxo, bluff -	34 26 56	120 25 39	"	164
Cortes Shoal, Bishop Rock 15 feet -	32 25 45	119 5 0	"	164
San Clemente Island, rocky islet at N.W. anchorage -	33 2 0	118 34 0	"	166
Santa Catalina Island, rock at North cove -	33 26 34	118 28 45	Commr. James Wood, U.S.N.	166
Santa Barbara Island, summit -	33 30 0	119 2 0	"	168
San Nicolas Island, S.E. point -	33 14 13	119 25 0	"	168
John Begg Rock, 40 feet high -	33 22 30	119 39 30	"	169
Anacapa Island, East end -	34 1 0	119 19 0	"	169
Santa Cruz Island, Prisoners' Harbour -	34 1 10	119 40 0	"	169
Santa Rosa Island, W. point -	33 58 30	120 12 30	"	170
San Miguel Island, Cuylers Harb., S.W. part -	34 3 0	120 20 27	"	171
San Luis Obispo, bluff West of creek -	35 10 37	120 43 31	U.S. Co. Survey.	172
San Simeon, beach at S.W. part -	35 38 24	121 10 22	"	174
Point Pinos, lighthouse -	36 37 58	121 55 0	"	176
MONTEREY, Custom-house wharf -	36 36 17	121 52 27	"	177
Santa Cruz, bluff at embarcadero -	36 57 27	122 0 10	"	179
SAN FRANCISCO, Point Boneta lightho. -	37 49 10	122 30 50	"	184
" Telegraph Hill, near Observatory -	37 47 53	122 23 10	By Electric Telegraph.	184
" Presidio, astronomical station -	37 47 29	122 26 15	U.S. Co. Survey.	184
Sir Francis Drake's Bay, astronomical station East of head -	37 59 35	122 57 36	"	196
Point Reyes, lighthouse -	37 59 39	123 0 13	"	196
South Farallon lighthouse -	37 41 49	122 59 5	"	197
North Farallon -	37 46 1	123 5 25	"	198
Bodega Head, summit 1 mile from extreme -	38 18 20	123 2 47	"	200
Bodega Bay, Fort Ross -	38 30 0	123 13 0	"	201
Point Arena, extreme -	38 57 0	123 45 0	"	203
Shelter Cove, S.E. part of bluff -	40 1 14	124 3 3	"	205

TABLE OF GEOGRAPHICAL POSITIONS.

xv

Authorities.	Page		Lat. North.	Long. West.	Authorities.	Page
St. Kollett.	148	Cape Mendocino - - -	40 25 0	124 22 0	U.S. Co. Survey.	206
"	149	Humboldt Bay, lighthouse on North spit -	40 46 4	124 12 21	"	208
E. Belcher.	149	Trinidad Bay, neck near town -	41 3 20	124 8 8	"	210
Vancouver.	150	Klamath River, entrance -	41 33 0	124 5 0	"	211
"	150	Crescent City Bay, lighthouse -	41 44 34	124 11 22	"	212
"	150	Pelican Bay, entrance of river -	41 54 0	124 11 0	"	213
"	151					
COAST OF OREGON.						
		Port Orford, summit of ridge W. of town -	42 24 22	124 28 47	"	220
		Cape Orford or Blanco - - -	42 50 0	124 30 0	"	222
		Coquille River, entrance -	43 7 0	124 24 0	"	223
ho Survey by	156	Cape Gregory or Arago, N.W. point -	43 20 30	124 22 15	"	224
U.S. officers	157	Koos Bay, Koos Head -	43 21 4	124 18 0	"	225
er Lieut. W.	158	Umpquah River, lighthouse -	43 40 19	124 11 1	"	227
Bartlett, 1849;		Cape Perpetua - - -	44 19 0	124 6 0	"	228
nm. J. Alden,		Cape Foulweather - - -	44 45 0	124 4 0	"	229
3; and As-		Cape Lookout - - -	45 20 0	124 0 0	"	230
stant Geo. Da-		Cape Meares - - -	45 30 0	123 58 0	"	230
non, 1863.	158	Tillamook Bay, entrance -	45 34 0	123 57 0	"	230
E. Belcher.	159	Columbia River, Point Adams -	46 12 30	123 56 56	"	234
"	160	" Cape Disappointment,				
"	161	lighthouse -	46 16 33	124 2 13	"	236
"	162	" Astor Point -	46 11 28	123 49 32	"	239
"	163					
"	164					
"	164					
WASHINGTON TERRITORY.						
	166	Shoalwater Bay, Leadbetter or Low Point	46 36 45	124 0 45	"	242
mmr. James	166	Cape Shoalwater, lighthouse -	46 44 11	124 2 24	"	243
od, R.N.	168	Gray's Harbour, Point Hanson -	46 53 49	124 6 42	"	246
"	168	Point Grenville, bluff -	47 20 0	124 14 0	"	248
"	169					
"	169					
"	169					
"	170					
JUAN DE FUCA STRAIT.						
	171	Cape Flattery, lighthouse on Tatouch Id. -	48 23 10	124 45 10	Capt. Kollett.	253
	172	Neeah Bay, Obs. pt., Wyadda Island -	48 22 30	124 36 15	"	254
S. Co. Survey.	174	New Dungeness, lighthouse on North end				
"	176	of spit - - -	48 10 59	123 6 7	"	259
"	177	Blunt or Smith Island, lightho. on highest				
"	179	part - - -	48 19 0	122 51 30	"	267
"	184					
ADMIRALTY INLET.						
y Electric Te-	184	Whidbey Island, Admiralty Head lightho.	48 9 22	122 39 30	"	258
aph.		Restoration Point - - -	47 35 6	122 28 15	Vancouver.	260
Co. Survey.	184	Steilacoom, Fort - - -	47 9 50	122 32 0	"	262
"	196	Budd Inlet: Olympia - - -	47 1 39	122 51 0	"	263
"	196	Whidbey Island, Partridge Point -	48 12 30	122 45 0	"	266
"	197	Lummi Island, North point -	48 44 53	122 42 12	"	269
"	198	Semiamoo Bay, Parallel station -	49 0 0	122 45 30	Captain G. H.	269
"	200				Richards.	
"	201	Lopez Island, Cape Colville, S.E. point -	48 25 35	122 48 30	"	274
"	203	San Juan Island, H. B. Co.'s post at S. end	48 27 45	123 2 0	"	293
"	206					

	Lat. North.	Long. West.	Authorities.	Page
VANCOUVER ISLAND, ETC.				
Port San Juan, Pinnacle Rock, North side of bay -	48 33 30	124 27 37	Comm. Wool.	316
Sooke Inlet, Secretary Island -	48 19 35	123 42 40	D. Pender, R.N.	317
Race Island, lightho. on Great Race Rock -	48 17 45	123 32 15	"	318
Esquimalt Harbour, Duntze Head -	48 25 49	123 26 45	G. H. Richards.	320
VICTORIA HARBOUR, Laurel point -	48 25 22	123 23 2	"	322
Barclay Sound, Cape Beale, S.E. point -	48 47 48	125 12 52	"	328
" Observ. islet, Island harb. -	48 54 41	125 16 54	"	336
" Observ. Id., Alberni canal -				
Stamp harbour -	49 13 46	124 50 7	"	331
Clayoquot Sound, Observ. I., Hecate Bay -	49 15 22	125 56 17	"	343
Refuge Cove, village on West side -	49 20 50	126 16 40	"	
Hesquiat Harbour, boat cove -	49 27 31	126 25 27	"	347
Estevan Point, South extreme -	49 22 7	126 32 32	"	348
Nootka Sound, Friendly Cove -	49 35 31	126 37 32	"	351
Nuchatlitz Inlet, Port Langford, Colwood Islet -	49 47 20	126 57 5	"	355
Esperanza Inlet, rock, Queen's cove -	49 52 45	126 59 55	"	357
Kyuquot Sound, Shingle point, at entrance of Narrowgut creek -	49 59 55	127 9 30	"	360
Nasparti Inlet, Head beach -	50 11 21	127 37 58	"	364
Cape Cook or Woody Point, Solander Id. -	50 6 31	127 57 20	"	365
Quatsino Sound, Observ. islet, Koprino harbour -	50 30 0	127 52 16	"	371
" rock, North harbour -	50 29 25	128 3 39	"	370
BRITISH COLUMBIA.				
Point Roberts, Parallel station, W. side -	49 0 0	123 5 26	"	379
Fraser River entrance, Garry point -	49 7 4	123 12 1	"	380
New Westminster, Military barracks -	49 13 1	122 54 26	"	383
Burrard Inlet, English Bay, Government reserve -	49 16 18	123 12 0	"	385
Nanaimo Harbour, Dr. Benson's house -	49 10 15	123 56 36	"	389
Howe Sound, Plumper Cove -	49 24 39	123 29 20	"	391
Nanoose Harbour, Entrance Rock -	49 15 43	124 8 6	"	393
Baynes Sound, Henry Bay, Beak point -	49 36 29	124 51 18	"	398
Quathiasky Cove, Valdes Island, S. point -	50 2 42	125 14 38	"	411
Knox Bay, Thurlow island, Stream at head of bay -	50 24 15	125 39 0	"	414
Port Neville, Robber's nob -	50 31 9	126 4 21	"	415
Port Harvey, Tide pole islet -	50 33 58	126 16 40	"	416
Alert Bay, Cormorant island, Yellow bluff -	50 35 2	126 57 30	"	
Beaver Harbour, Fort Rupert, Shell islet -	50 42 36	127 25 7	"	419
Port Alexander, Goletas channel, islet in centre of port -	50 50 49	127 39 57	"	421
Bull Harbour, Hope island, North point, Indian island -	50 54 47	127 56 3	"	422
Triangle Island, Scott islands, W. point -	50 51 53	129 6 32	"	424
Cape Scott, summit of cape -	50 46 41	128 26 45	"	425
Cape Caution -	51 12 0	127 57 30	"	426

TABLE OF GEOGRAPHICAL POSITIONS.

xvii

Authorities.	Page		Lat. North.	Long. West.	Authorities.	Page
		Virgin Rocks - - -	51 19 0	128 10 0	Vancouver.	426
		Pearl Rocks - - -	51 24 0	128 7 0	"	426
		Smith Inlet, islet off entrance - -	51 18 0	128 1 0	"	426
		Rivers Canal, entrance - - -	51 25 0	127 53 0	"	426
m. Wool.	316	Calvert Island, South point - -	51 25 40	128 1 30	"	426
Pender, R.N.	317	Fitzhugh Sound, Pt. Walker - -	51 57 0	127 57 0	"	427
I. Richards.	318	Restoration Cove - - -	52 1 30	127 47 0	"	427
	320	Burke Canal - - -	52 26 0	127 31 0	"	428
	322	Fisher Canal, Port John - - -	52 7 0	127 59 0	"	428
	328	Milbank Sound, Cape Swaine - -	52 13 0	128 30 0	"	428
	336	Milbank Sound, Fort M'Loughlin -	52 12 0	128 24 0	"	429
		Mussel Canal, Poison Cove - -	52 55 0	128 10 0	"	429
	331	Gardner Canal, Pt. Staniforth - -	53 54 0	128 44 0	"	430
	343	Canal de Principe, Pt. Stephens -	53 28 0	129 48 0	"	432
		Port Essington, Pt. Lambert - -	54 10 20	130 2 30	"	431
	347	Stephen Island, rocks off N.W. side	54 17 0	130 48 0	"	431
	348	Point Maskelyne, entrance of Works canal	54 42 0	130 24 0	"	432
	351	Fort Simpson, anchorage - - -	54 34 0	130 25 30	"	433
	355	Observatory Inlet, Salmon Cove -	55 15 34	129 52 30	"	434
	357	Portland Canal, head - - -	55 45 0	130 5 0	"	434
		QUEEN CHARLOTTE ISLANDS.				
	360	Cape St. James - - -	51 57 0	130 52 0	Russian Chart.	437
	364	Houston Stewart Channel, Forsyth Pt. -	52 9 0	131 7 0	Mr. Inskip, 1855,	437
	365	Cumshewas Harbour, I. North of entr. -	53 1 0	131 22 0	and H. B. Co.	438
	371	Skidegate Channel, Bar rock at E. entr. -	53 22 30	131 40 0	"	438
	370	Cape Ball - - -	53 42 0	131 36 0	"	438
		Ymbisile or Rose Pt. - - -	54 13 0	131 22 0	"	439
		" extremity of reef - - -	54 15 0	131 11 0	"	439
		Virago Sound, Inskip point - - -	54 2 0	132 16 0	"	440
		Langara or North Id., North pt. - -	54 21 0	133 0 0	"	440
		Hippah Island, West point - - -	53 33 0	132 57 0	"	440
		Skidegate Channel, Point Buck - -	53 9 0	132 25 0	"	441
		Port Kuper, Sansum Island in Mitchell	52 56 31	132 9 40	G. Moore, R.N.	441
		Harbour - - -	52 56 0	131 22 0	Chart, &c.	442
	379	Cape Henry - - -	52 37 0	132 2 0	"	442
	380	Taseo Harbour, entrance - - -	52 5 0	131 17 0	"	442
	383	Anthony Island, South point - - -	52 5 0	131 17 0	"	442
		COAST OF ALASKA.				
	385					
	389					
	391					
	393					
	398					
	411	Cape Fox - - -	54 45 0	130 49 0	Vancouver.	449
		Tongass, U.S. post - - -	54 42 0	130 29 0	"	449
	414	Cape Northumberland - - -	54 52 0	131 15 0	"	450
	415	Behm Canal, Point Sykes - - -	55 6 0	131 7 0	"	450
	416	" New Eddystone Rock - - -	55 29 0	130 55 0	"	450
		Revilla-Gigedo Island, Point Whaley, N.	55 56 0	131 18 0	"	451
	419	point - - -	55 38 15	131 47 0	"	451
		Port Stewart, Islet on S.W. side - -	55 29 0	131 54 0	"	452
	421	Cape Caamano - - -	54 55 40	131 31 0	"	453
		Duke of Clarence Strait, Point Percy -	54 43 0	131 56 0	"	453
	422	" Cape de Chacon - - -	55 46 0	132 13 0	"	453
	424	Prince Ernest Sound, Point le Mesurier -	56 9 0	132 0 0	"	454
	425	" Point Warde - - -	56 34 0	132 22 0	"	454
	426	Point Highfield - - -	56 31 0	132 20 0	"	454
		Etoline Harbour, Wrangel, U.S. post -	56 31 0	132 20 0	"	454

North Pacific.

	Lat. North.	Long. West.	Authorities.	Page
Fort Sitkine (H. B. C. post) - - -	56 40 0	132 48 0	Vancouver.	464
Point Howe - - -	56 34 0	132 48 0	"	464
Port Protection, Point Baker - - -	56 29 30	133 36 0	"	465
Port Beauclerc, Islet off - - -	56 15 0	133 48 0	"	466
Point St. Albans - - -	56 7 0	133 35 0	"	467
Cape Decision - - -	56 2 0	134 3 0	"	467
Cape Polo - - -	55 58 0	133 45 0	"	467
Cape Addington - - -	55 27 0	133 48 0	"	437
Cape San Bartolomé - - -	55 12 30	133 36 0	"	458
Rasa Island, or Wolf Rock - - -	55 1 0	133 29 0	"	458
San Carlos, Douglas, or Forrester Island, South point - - -	55 18 0	133 32 0	"	459
Christian Sound, Port Malmesbury - - -	56 17 0	134 11 0	"	459
Point Ellis - - -	56 31 0	134 16 0	"	459
Prince Frederick Sound, Point Kingmill- Pt. Camden, Pt. Macartney - - -	56 51 0	134 22 0	"	459
Admiralty Island, Point Gardner - - -	57 2 0	133 58 0	"	463
Point Nepean - - -	57 1 0	134 32 0	"	463
Cape Fanshaw - - -	57 10 0	134 5 0	"	460
Stephens Passage, Port Houghton, N. pt. Port Snettisham, Teco, H.B.C. establishment - - -	57 19 30	133 26 0	"	461
Point Retreat - - -	57 54 0	133 37 0	"	462
Chatham Strait, Hood Bay, Point Samuel Point Marsden - - -	58 24 0	134 59 0	"	463
Lynn Canal, Point Courverden - - -	57 28 0	134 39 0	"	464
Seduction Point - - -	58 7 30	134 67 0	"	464
" - - -	58 12 0	135 4 0	"	465
" - - -	59 2 0	135 23 0	"	465
THE SITKA ARCHIPELAGO.				
Cape Ommaney, Wooden Island - - -	56 10 0	134 33 0	"	467
Port Conclusion, Ship's Cove - - -	56 15 0	134 33 30	"	468
Point Augusta - - -	58 3 30	135 1 0	"	468
Point Adolphus - - -	58 18 0	138 42 0	"	468
Port Althorp, entrance - - -	58 12 0	136 16 0	"	469
Cape Cross - - -	57 56 0	136 28 0	"	471
Portlock Harbour - - -	57 44 0	136 11 0	"	471
Cape Edward - - -	57 39 0	136 10 0	"	471
Bay of Islands, Point Amelia - - -	57 17 0	135 46 0	"	472
Kruzov Island, Cape Edgcombe - - -	57 0 20	135 46 30	Russian Chart, 1848.	472
Sitka or Norfolk Sound, Novo Arklungel, Arsenal - - -	57 2 45	135 17 40	Russian Chart and Vancouver.	472
Point Wodehouse - - -	56 47 0	135 41 0	"	473
Cross Sound, Pt. Wimbledon - - -	58 19 0	136 15 0	"	470
Cape Sponcer - - -	58 14 0	136 35 0	"	469
Cape Fairweather - - -	58 50 30	137 50 0	"	476
Mount Fairweather - - -	58 54 0	137 38 0	"	476
Behring Bay, Cape Phipps - - -	59 33 0	139 47 0	"	477
Port Mulgrave, Pt. Turner - - -	59 32 30	139 43 0	Sir E. Belcher.	477
Diggs Bay, Pt. Latouche - - -	59 51 0	139 32 0	Vancouver.	478
Point Manby - - -	59 42 0	140 13 0	"	479
Point Riou - - -	59 54 0	141 14 0	Sir E. Belcher.	479
Mount St. Elias, 14,987 feet - - -	60 18 0	140 52 0	"	480
Pamplona Rock - - -	59 3 0	142 15 0	Spanish Chart.	480
Cape Suckling - - -	60 1 0	143 54 0	ib.; Sir E. Belcher.	481
Kaye Island, Cape Hamond - - -	59 47 0	144 28 0	Vancouver.	482
Prince William Sound, Cape Witshed - - -	60 29 0	145 47 30	"	482
Cape Hinchinbrook - - -	60 16 30	146 27 0	"	483
Port Etches, Phipps Pt. - - -	60 21 12	146 32 0	Sir E. Belcher.	483
Port Gravina, S.E. point - - -	60 41 0	145 18 0	"	484
Snug Corner Bay - - -	60 45 0	146 35 0	Vancouver.	484

TABLE OF GEOGRAPHICAL POSITIONS.

xix

Authorities.	Page		Lat. North.	Long. West.	Authorities.	Page
Vancouver.	454	Prince William Sound, Pt. Valdes, Pt.			Vancouver.	485
"	454	Freemantle -	60 57 0	146 49 0	"	485
"	455	" Point Culross -	60 44 30	147 52 0	"	487
"	456	" Montagu Island, South point -	59 46 0	147 30 0	"	487
"	457	" Port Chalmers, peninsula -	60 16 0	146 50 0	"	486
"	457	Cape Puget -	59 55 0	148 8 0	"	488
"	457	Chiswell Islands, South group -	59 31 0	149 2 0	"	488
"	457	Pie Islands, South extreme -	59 19 0	149 51 0	"	488
"	457	Point Goro -	59 11 0	150 22 0	"	488
"	458	Cook Inlet, Cape Elizabeth -	59 9 0	151 18 0	"	489
"	458	" Port Chatham, watering place -	59 14 0	151 8 0	"	489
"	459	" Point Bede -	59 19 30	151 27 0	"	490
"	459	" Tschougatschouk Bay, Anchor			"	490
"	459	Point -	59 39 0	151 24 0	"	491
"	459	" Coulgiack Island, Coal Bay -	60 27 0	151 31 0	"	491
"	460	" West Foreland -	60 42 0	151 12 0	"	492
"	460	" North Foreland -	61 4 0	150 35 0	"	490
"	460	Cook Inlet, Ouchougnat Island, or Mount			"	490
"	460	St. Augustin -	59 22 0	153 0 0	"	490
"	461	" Cape Douglas -	58 52 0	152 51 0	"	490
	462	KODIAK ARCHIPELAGO.				
"	463	Kodiak Island, Greville or Tolstoy Cape -	57 34 0	151 48 0	Lisiansky.	496
"	464	" Chiniatskoy Bay, Gorbou Rock -	57 41 0	151 55 0	"	494
"	464	" St. Paul Harbour -	57 47 0	152 4 0	"	494
"	465	" Igatskoy Bay, Cape Tonkoy -	57 25 0	151 57 0	"	496
"	465	" Kihuden Bay, Nahchemood sett. -	57 17 0	152 34 0	"	496
		" Cape Trinity -	56 45 0	153 33 0	Vancouver.	496
		Peninsula of Alaska, Pinalo Bay -	57 46 0	155 0 0	Wassilieff.	501
"	467	" Wrangell Harb., S.W. side -	56 59 3	155 57 0	"	501
"	468	" Eydokoeff Islands, S. isld. -	56 0 0	156 22 0	Golownin.	501
"	468	" St. Stephen Island -	56 10 0	155 22 0	(Krusenstern.)	502
"	468	" Tschirikoff Island, N.E. pt. -	55 56 0	155 0 0	Vancouver.	502
"	469	" Schumagin Islands, Ounga				
"	471	North point -	55 42 0	160 50 0	Sarytscheff.	502
"	471	" " Kagay Id. -	55 5 0	160 33 0	"	502
"	471	" " Tagh - Kiniagh				
"	472	Island -	54 46 0	159 40 0	Golownin.	502
ussian Chart,	472	" Sannah or Halibut Id., cent.	54 27 0	162 50 0	Sarytscheff.	503
848.		ALEUTIAN ARCHIPELAGO.				
ussian Chart	472	Ounimak Id., Chichaldinskoi volcano -	54 45 0	163 59 0	"	505
nd Vancouver.	470	" Cape Mordvinoff -	54 51 0	164 29 0	"	506
"	469	Krenitzin Islands, Ougamok Island -	54 17 0	164 47 0	Kotzebue.	506
"	476	Tigalga Island, centre -	54 5 0	165 0 0	"	506
"	476	Akoun Island, North point -	54 22 0	165 40 0	"	507
"	477	Ounalashka Island, S.W. point -	53 13 0	167 47 0	Lutke.	507
" E. Belcher.	477	" Port Illuluk -	53 22 25	167 32 0	Kotzebue.	507
Vancouver.	478	" -	52 50 0	168 42 0	"	509
"	479	Oumnak Island, Cape Sigak -	53 56 20	167 58 0	Sarytscheff.	510
" E. Belcher.	479	Joann Bogosloff Island -	52 40 0	170 15 0	Kotzebue.	510
"	480	Younaska Island -	52 33 0	171 4 0	Tobenkoff.	511
anish Chart.	480	Amougtha Island, centre -	52 22 0	172 18 0	"	511
Sir E. Belcher.	481	Seguam Island -	52 6 30	172 50 0	Lutke.	512
Vancouver.	482	Atkha Island, Korovinskai Bay, S. capo -	52 12 50	174 20 0	Inghestrom and	513
"	482	" Nikolskoi Village -	52 17 18	174 12 0	Etolino.	513
"	483	Sitkhin Island, centre -	52 4 30	176 2 0	Stanikowitch.	514
" E. Belcher.	483	Adakh Island, North end -	52 4 6	176 20 0	Inghestrom.	514
"	484	Kanaga Island, North point -	52 4 0	176 50 0	"	514
Vancouver.	484					

TABLE OF GEOGRAPHICAL POSITIONS.

	Lat. North.	Long.	Authorities.	Page
		Long. W.		
Tanaga Island, N.W. peak	51 59 0	178 10 0	Sarytschhoff.	514
Goreloy or Burnt Island	51 50 0	178 40 0	"	514
Amatignak Island	51 5 0	178 55 0	"	515
		Long. E.		
Semisopochnoi, or Seven Mountains Id.	51 59 0	179 45 57	Inghestrom.	515
Amtschatka Island, West point	51 43 0	178 45 0	"	515
" " Kirilovskaja Bay	51 27 1	179 9 54	"	515
Kryci or Rat Island	51 45 0	179 20 0	"	516
Kiska Island, North point	52 22 0	177 50 0	"	516
Bouldyr Island, centre	52 40 0	176 13 0	"	516
Semitsch Island	53 6 0	174 0 0	"	516
Agattou Island	52 43 0	173 37 0	"	516
Attou Island, Tschitschagoff Bay	52 56 0	173 20 0	Etoline.	516
SEA OF BEHRING.				
Point Krenitzin				518
Izenbek (or Cto. Heiden) Bay, Cape Glaze- nap, or Mitkoff	55 14 8	162 50 7	Lutke.	518
Amak or Aamak Island, South extreme	55 25 0	163 1 5	Stanikowitch.	518
Cape Roshnoff	55 58 0	161 0 0	"	518
Moller Bay, Kritskoi Island, E. point	56 0 7	160 41 0	"	519
Cape Senniavine	56 23 7	160 2 7	"	519
Cape Stroganoff	56 52 0	158 51 0	"	519
Cape Menchikoff	57 30 4	157 58 5	"	520
Ougatchik, or Soulima River, Cape Greig	57 43 0	157 47 2	"	520
Bristol Bay, Cape Tschitschagoff	58 17 0	157 34 0	"	520
River Nanek, Paougvigumut village	58 42 1	157 0 5	"	520
Chramtschenko Bay, Cape Constantine	58 29 0	158 45 0	Von Wrangel.	520
Nouchagak River, Fort Alexandroffsk	58 57 0	158 18 0	"	521
Hagemeister Island, Calm Point	58 25 0	160 55 0	Chramtschenko.	521
Cape Newenham	58 42 0	162 24 0	Cook, 1778.	521
Bay of Good News, N. pt. of entrance	59 3 9	161 53 0	Etoline.	522
Kuskowine River, N.W. point	59 50 0	162 10 0	Chramtschenko.	521
Cape Avinoff	59 50 0	154 0 0	"	522
Nuniwak Island, N.E. extreme	60 32 0	165 30 0	Wassilioff.	522
" " S.E. point	60 0 0	165 3 0	"	522
Cape Vancouver	60 44 0	165 0 0	Etoline.	522
Cape Romanzoff	61 61 32	166 28 0	Chramtschenko.	522
Yukou River, Aphoon Mouth	63 10 0	164 5 0	Zagoskin.	524
Cape Stephens	63 35 0	162 19 0	Cook.	524
Chaktolimout Bay, Tebenkoff Cove	63 28 30	161 52 0	Tebenkoff.	524
Fort Michaelooski	63 21 0	161 51 0	Kellott.	524
Unalachleet, trading port	63 53 33	160 30 16	Zagoskin.	525
Cape Denbigh, Fort St. Michael	64 19 0	161 10 0	Cook.	526
Cape Darby	64 21 0	163 0 0	"	526
Golovnine Bay, Stone Mole	64 28 42	163 8 0	Tebenkoff.	526
Aziak or Sledge Island, 642 feet	64 31 0	166 9 0	Cook.	527
Point Rodney, northern peak	64 42 10	166 17 50	Beechey.	527
Port Clarence, Point Spencer	65 16 40	166 47 50	"	527
Oukivok, or King's Island, 756 feet	64 58 49	167 57 47	Cook.	527
Cape York	65 24 10	167 19 40	Beechey.	529
Cape Prince of Wales (West Cape of America), bluff	65 33 30	167 59 10	"	529
Diomede Islands, Fairway Rock, centre	65 38 40	168 43 45	"	530
		Long. W.		
St. Lawrence Island, Schischmareff point	63 46 0	161 41 0	Schischmareff.	531

TABLE OF GEOGRAPHICAL POSITIONS.

xvi

Authorities.	Page	Lat. North.	Long. West.	Authorities.	Page
St. Lawrence I-land, N. point . . .		63 12 0	159 50 0	Schischmareff.	531
St. Matthew Island (Matvoi, or Gore's Id.) . . .					
Cape Upright, S.E. point . . .	514	60 18 0	172 4 0	Lutke.	531
Cape Gore . . .	514	60 30 0	172 50 0	"	531
Morjovi Island, N. point . . .	515	60 44 0	172 52 0	"	532
Pribiloff Islands, St. George's Id., E. pt. . .	515	56 38 0	169 10 0	"	533
St. Paul's Id., Sivoutchi Islet . . .	515	57 5 0	169 51 0	Tchistiakoff.	534
COAST OF ASIA.					
EAST CAPE of Asia . . .	516	66 3 0	169 44 0	Beechey.	536
St. Lawrence Bay, Cape le Kyleougoun . . .	516	65 29 40	171 0 0	Lutke.	536
Cape Pnaougoun . . .	516	65 37 30	170 53 30	"	536
Metchigmenek Bay, entrance . . .	516	65 30 30	172 0 0	"	538
Cape Khaluetkin . . .	516	65 15 0	172 10 0	"	538
Cape Nygthygan . . .	516	65 2 0	172 0 0	"	538
Cape Neetchan . . .	516	64 55 30	172 17 30	"	539
Arakuntchetchen Island, Cape Kyghynin . . .	516	64 46 0	172 7 0	"	540
Cape Mortens . . .	516	64 33 15	172 20 0	"	540
Ittygran Island, Cape Postels . . .	518	64 37 0	172 21 0	"	541
Cape Tchaplina . . .	518	64 24 30	172 14 0	"	541
Cape Tchoukotakoi . . .	518	64 16 0	173 10 0	"	541
Port Providence, Emma Harbour . . .	518	64 25 55	173 7 15	Moore, 1849.	543
Cape Spanberg . . .	518	64 42 30	174 42 0	Lutke.	543
Cape Atchoun . . .	518	64 46 0	175 28 0	"	543
Transfiguration Bay . . .	519	61 50 0	175 25 0	"	543
Cape Behring . . .	519	65 0 30	175 57 0	"	544
Gulf of St. Croix, Cape Meetchken . . .	519	65 28 40	178 47 0	"	544
Mount Linlingai, 1,462 feet . . .	520	65 36 30	178 17 0	"	545
River Anadyr, mouth . . .	520	64 50 0	178 40 0	Charts.	546
Cape St. Thaddous . . .	520	62 42 0	179 38 0	Lutke.	546
Archangel Gabriel Bay, N. point of entr. . .	520	62 28 0	179 22 0	"	546
Cape Navarin, 2,512 feet . . .	521	62 16 0	179 4 30	"	546
Cape Olutskoi . . .	521	59 58 0	170 28 0	"	547
Cape Govenskoi . . .	521	59 50 0	166 18 0	"	547
Cape Ilpinski . . .	522	59 48 30	165 57 0	"	547
Verkhotoursky, or Little Karaghinsky Id. . .	521	59 37 30	165 43 0	"	547
Commander Islands, Behring Island, Cape					
Khitroff . . .	522	54 56 0	166 43 0	"	548
" " Cape Youchin . . .	522	55 25 0	165 58 0	"	548
" " W. extremity . . .	522	55 17 2	165 49 57	Beechey.	548
Medny or Copper Island, settlement . . .	524	54 47 0	168 0 0	Charts.	549
" " S.E. extremity . . .	524	54 32 24	168 9 0	Golownin.	549
" " N.W. extremity . . .	524	54 52 25	167 31 0	"	549
KAMCHATKA.					
Karaghinsky Island, Cape Golenichtcheff . . .	527	59 13 30	164 40 0	Lutke.	551
Cape Krachenninikoff . . .	527	58 28 0	163 32 0	"	552
Cape Ilpinski . . .	529	59 48 30	165 57 0	"	552
Cape Kouzmichtcheff . . .	529	59 5 0	163 19 0	"	552
Karaghinskai Bay, mouth of the Karaga . . .	529	59 8 0	162 59 0	"	552
S. point . . .	530	58 55 0	163 2 0	"	552
Cape Oukinskoi . . .	530	57 58 0	162 47 0	"	552
Cape Ozernoi . . .	531	57 18 0	163 14 0	"	553

	Lat. North.	Long. East.	Authorities.	Page
River Stolbovskaja	56 40 30	162 39 0	Lutke.	553
Cape Stolbovoi	56 40 30	163 21 0	"	553
Cape Kamtschatskoi	56 10 0	163 25 0	"	553
Klutchevskoi Volcano, 15,766 feet	56 8 0	160 45 0	"	553
Cape Kronotskoi	54 54 0	162 13 0	"	554
Kronotskoi Volcano, 10,610 feet	54 45 0	160 37 0	"	554
Cape Shipounsky	53 6 0	160 4 0	"	554
Villeuchinsky Peak, 7,372 feet	52 39 43	158 20 39	Beechey.	557
Avatcha or Awatska Volcano, 11,500 feet	53 20 1	"	"	558
Avatcha Bay, church at Petropaulovski	53 1 0	158 43 30	"	560
Cape Gavareah	52 21 43	158 39 8	"	562
Cape Lopatka	51 2 0	156 50 0	Lutke.	562
KURILE ISLANDS.				
Alaid Island	50 54 0	155 32 0	Krusenstern.	563
Sumshu Island, centre	50 46 0	156 26 0	"	563
Poromushir Island, high mountain	50 15 0	155 24 15	"	563
" North point	51 0 0	"	Gillett.	563
Shirinsky Island	50 10 0	154 58 0	Krusenstern.	563
Monkonrushi Island, centre	49 51 0	154 32 0	"	563
Avos Rock	49 49 0	154 19 0	"	564
Onnekotan Island, Cape Krenitzin	49 19 0	154 44 0	"	564
Kharumukotan Island, centre peak	49 8 0	154 39 0	"	564
Shirashkotan Island, centre	48 52 0	154 8 0	"	564
Tshirinkotan Island	48 44 0	153 24 0	"	564
The Snares	48 35 0	153 44 0	"	564
Ruukoko Island, peak	48 16 20	153 15 0	"	564
Matua Island, Sarytscheff Peak	48 6 0	153 12 30	"	564
Rashau Island	47 47 0	152 55 0	"	564
Ushishir Island, South point	47 32 40	152 38 30	Golownin.	565
Ketoy Island, South extremity	47 17 30	152 24 0	"	565
Simusir Island, Prevost Peak	47 2 50	151 52 60	"	565
The Four Brothers, South Torpo island	46 29 15	150 33 30	"	565
Broughton Island	46 42 30	150 28 30	"	565
Urup or Staaten Island, Cape Castricum,	"	"	"	"
" North point	46 16 0	150 22 0	"	566
" Cape Van der Lind, S. pt.	45 39 0	149 34 0	"	566
Urup Island, N.E. point	45 38 30	149 14 0	"	566
" Cape Rikord, South point	44 29 0	146 34 0	"	566
Tschikotan or Spanberg Island, centre	43 53 0	146 43 30	"	566
Kunashire Island, St. Antony's peak	44 31 0	145 46 0	"	567
" Estab. in Traitor's Bay	43 44 0	144 59 30	"	567
SEA OF OKHOTSK.				
Cape Lopatka	51 2 0	156 50 0	Lutke.	568
Bolcheretskoi	52 54 30	158 22 0	King.	568
Tigilsk	58 1 0	158 15 0	Charts.	569
Cape Outholotskoi	57 28 0	155 45 0	"	569
Cape Bligan	59 20 0	152 50 0	"	569
Poustaresk	61 0 0	162 30 0	"	569
Kaminoi, at the mouth of the Pergina Riv.	62 0 0	162 50 0	"	569
Ghijega, or Fort Jieiginsk	61 40 0	160 0 0	"	569
Jamsk	59 29 0	153 0 0	"	570
Taouinsk	59 56 0	148 30 0	"	570
Okhotsk	59 20 0	143 14 0	"	570
Port Aian, Cape Vneski	56 25 50	138 25 60	Tronson, 1855.	571
Jonas Island, 1,200 feet	56 25 30	143 16 0	Krusenstern.	572
Fort Oudskoi	54 29 0	134 58 0	Kosmin.	572
Great Shantar Island, North point	55 11 0	137 44 0	"	572

Authorities.	Page		Lat. North.	Long. East.	Authorities.	Page
Lutke.	553	Great Shantar Island, Prokofleff Island	55 2 0	138 22 0	Kosmin.	572
"	553	" Koassoff Island	54 43 0	138 12 0	"	572
"	553	Cape Linekinskoy	54 14 0	136 24 0	Charts.	573
"	554	River Tugura, mouth	53 40 0		"	573
"	554	Cape Khabaroff	53 40 0	141 22 0	"	573
Beechey.	557	ISLAND OF SAGHALIN.				
"	558	Cape Elizabeth	54 24 30	142 47 0	Krusenstern.	574
"	560	Cape Maria	54 17 30	142 17 45	"	574
"	562	North Bay, Tartar colony	54 15 45	142 37 0	"	574
Lutke.	562	Nadijeda Bay, Cape Horner	54 10 15	142 27 34	"	574
		Cape Golovatcheff	53 30 15	141 55 0	"	574
Krusenstern.	563	Cape Löwenstern	54 5 15	143 12 30	"	575
"	563	Cape Klokatcheff	53 46 0	143 7 0	"	575
"	563	Cape Wurst	52 57 30	143 17 30	"	575
Gill-off.	563	Shoal Point	52 32 30	143 14 30	"	575
Krusenstern.	563	Downs Point	51 53 0	144 3 30	"	575
"	563	Cape Delisle	51 0 30	143 43 0	"	575
"	564	Cape Ratmanoff	50 48 0	143 53 15	"	575
"	564	Cape Rinnik	50 12 30	144 5 0	"	575
"	564	Mount Tiara	50 3 0	143 27 0	"	575
"	564	Cape Bellingshansen	49 35 0	144 25 45	"	576
"	564	Cape Patience	48 52 0	144 16 15	"	576
"	564	Robben Island, N.E. point	48 36 0	144 33 0	"	576
"	564	River Neva, mouth	49 14 40	144 2 0	"	576
"	564	Cape Soimonoff	48 53 20	143 2 0	"	576
"	564	Cape Dalrymple	48 21 0	142 50 0	"	576
"	564	Cape Muloffsky	47 57 45	142 44 0	"	576
Golownin.	565	Bernizet Peak, or Mount Spanberg	47 33 0	142 20 0	"	576
"	565	Cape Seniavine	47 16 30	142 59 30	"	576
"	565	Cape Tonin	50 0	143 33 0	"	577
"	565	Cape Löwenorn	46 23 10	143 40 0	"	577
"	565	Cape Aniwa	46 2 20	143 30 20	"	577
"	565	Cape Crillon	45 54 15	141 57 56	"	577
"	566	La Dangereuse Rock	45 48 15	142 10 0	Ward, 1855.	578
"	566	Risiri, Pic de Langlo	45 11 0	141 12 15	Krusenstern.	578
"	566	Refusiri, Cape Hieber	45 27 45	141 0 0	"	578
"	566	Cape Notoro	45 54 15	142 1 55	Ward, 1859.	579
"	566	Cape Nossyab	45 25 50	141 34 20	"	579
"	567	Cape Disappointment	45 40 30	137 38 15	Tronson, 1856.	580
		GULF OF TARTARY, ETC.				
Lutke.	568	Cape Suffrein	47 20 0	138 58 0	"	581
King.	568	Fish River	47 55 0	139 31 0	"	581
Chart.	569	Low Cape	48 28 0	140 10 0	"	581
"	569	Beachy Head	48 56 0	140 21 0	"	581
"	569	Barracouta Harbour, Tullo Island	49 1 50	140 19 0	"	581
"	569	Castries Bay, Quoin Point	51 28 0	140 49 30	Forsyth.	582
"	569	Jonquière Bay	50 54 0	142 7 0	"	583
"	569	Napoléon Road, Musoir Rock (West point of entrance)	42 37 22	130 44 10	H.M.S. <i>Winches-</i> <i>ter</i> , 1855.	589
"	569	Guérin Gulf, sandy point	43 9 0	131 50 0	"	588
"	570	Hornet Bay, Fox Island	42 41 0	132 56 0	H.M.S. <i>Hornet</i> ,	589
"	570	Islet Point	42 49 0	133 51 0	1856.	589
Tronson, 1855.	571	Siau-Wuhu Bay, Observation spot on chart	42 54 14	133 50 32	Ward, 1859.	589
Krusenstern.	572	Port Michael Seymour, Observation spot at head of port	43 46 0	135 19 0	"	590
Kosmin.	572	St. Vladimir Bay, low point	43 53 40	135 27 21	"	591
"	572	Shelter Bay	44 28 0	136 2 0	Tronson, 1856.	591

	Lat. North.	Long. East.	Authorities.	Page
Sybilie Bay - - -	44 43 45	136 22 30	Tronson, 1856.	591
Pique Bay - - -	44 46 15	136 27 15	"	592
Bullock Bay - - -	45 2 0	136 44 0	"	592
Luké Point - - -	45 19 30	137 10 15	"	592
JAPANESE ARCHIPELAGO.				
KIUSIU AND SIKOK.				
Cape Chichakoff, Satano Misaki, extreme -	30 59 0	130 44 30	Japanese chart.	598
Kagosima, fortress - - -	31 37 0	130 38 0	"	599
Okino Sima, South point - - -	32 44 0	132 37 0	"	600
Nomi Harbour - - -	33 23 0	133 19 0	"	600
Kotsi Inlet - - -	33 30 0	133 35 0	"	601
INLAND SEA.				
Simonoseki, Moze Saki, South part -	33 58 0	130 58 24	Ward.	604
Hime Sima, East end - - -	33 45 0	131 42 0	Japanese chart.	606
Cape Iyo, North end - - -	34 10 0	132 57 0	"	608
Tomo, harbour - - -	34 23 0	133 24 0	"	608
Awadji Island, North point, light -	34 37 0	135 0 0	"	610
Hiogo, Kobe Point - - -	34 40 0	135 15 0	"	612
Oosaka, Timposon fort - - -	34 40 0	135 28 0	"	611
Kata, pier - - -	34 19 0	135 4 0	"	614
Hino Misaki, extreme - - -	33 52 0	135 6 0	"	617
Tanabé Bay, Cape Tanabé - - -	33 40 0	135 20 0	"	618
S.E. COAST OF NIPON.				
Oosima, Harbour of Kii, Pisayama Rock -	33 29 8	135 48 55	Ward, 1861.	619
Urakami Harbour, Village point - - -	33 33 37	135 55 11	"	620
Gulf of Suruga (Simidsu harb.), Miosaki -	35 0 51	138 31 7	"	623
" Eno-ura Bay, centre - - -	35 3 0	138 53 0	Russian frigate	624
" Heda Bay, centre - - -	34 58 11	138 46 0	<i>Diana</i> , 1853-55.	624
" Arari Bay, centre - - -	34 50 0	138 46 0	"	624
" Tago Bay, centre - - -	34 47 3	138 44 54	"	624
VOLCANIC ISLETS, S.E. OF JAPAN.				
Oosima or Vries Island, S.E. point -	34 39 30	139 28 0	Ward, 1860.	625
Kosu sima, highest part - - -	34 13 15	139 8 0	"	626
Miaki sima, highest part - - -	34 5 0	139 31 0	"	627
Mikura Island, highest part - - -	33 52 0	139 34 0	"	627
Redfield Rocks, southern - - -	33 56 50	138 48 15	"	627
Broughton Rock, centre - - -	33 39 0	139 17 45	"	628
Fatsizio Island, centre - - -	33 6 0	139 48 0	"	628
Aoga sima, eastern summit - - -	32 37 30	139 47 30	"	628
Koning Willem III. Island, centre -	31 52 48	139 58 46	La Gravière	629
La Bayonnaise Island - - -	32 0 41	139 59 20	Houckgeest.	629
Smith Island - - -	31 18 0	139 50 0	H.M.S. <i>Tribune</i> .	630
Ponafidin Island - - -	30 29 0	140 6 0	Ponafidin.	630
St. Peter's or Black Rock - - -	29 47 0	140 22 30	U.S. Expedition.	630
Cape Idsu, S.E. extreme - - -	34 35 0	138 52 0	American chart,	633
Rock Island, light on centre - - -	34 34 20	138 57 10	1864.	633

TABLE OF GEOGRAPHICAL POSITIONS.

XXV

Authorities.	Page		Lat. North.	Long. East.	Authorities.	Page
onson, 1856.	591	Simoda Harbour, centre island -	34 39 49	138 57 30	American chart.	634
"	592	Yedo Bay (Cape Sagami), extreme	35 8 0	139 42 0	Ward, 1861.	640
"	592	Yokohama, western pier -	35 26 11	139 39 20	"	641
"	592					
		STRAIT OF TSUGAR, ETC.				
		Cape Greig, small rock off South side -	41 5 39	140 20 19	Richards, 1855.	616
		Tatsupi saki, North side -	41 16 17	140 22 37	"	616
		Toriwi saki, centre of low island off -	41 33 34	140 56 36	"	646
		Red Cliff Point, extreme -	41 28 7	141 9 0	"	646
		Cape Nambu, small islet on West side -	41 25 24	141 28 32	"	647
		Cape Matsumae, islet off -	41 24 54	140 7 20	"	618
		Hakodadi Harbour, entrance to Kamida				
		Creek -	41 47 8	140 45 34	"	648
		ISLAND OF YESO.				
		Cape Broughton, East point -	43 38 30	146 7 30	Broughton.	653
		Cape Spanberg -	44 35 0	145 0 0	Japanese chart.	654
		Port Atkiss -	43 20 0	145 30 0	"	654
		Bay of Good Hope, peaked hill -	43 0 0	144 12 0	Broughton.	654
		Cape Eron or Evson -	41 59 9	142 55 0	Rikord.	654
		Volcano Bay, Endermo Harbour, entrance	42 33 11	140 50 32	Broughton.	655
		Cape Nadijeda -	41 25 10	141 9 30	Krusenstern.	656
		Matsumae, or Matsumai, city -	41 29 0	140 28 0	Von Siebold.	656
		Cape Sineko -	41 39 30	139 54 15	Krusenstern.	656
		Cape Oote Nizavou -	42 18 10	139 46 0	"	656
		Cape Kutusoff -	42 38 0	139 46 0	"	656
		Cape Novosilzov -	43 14 30	140 25 30	"	656
		Cape Malaspina -	43 42 51	141 18 30	"	656
		Mount or Peak Pallas -	44 0 0	141 54 0	"	656
		Cape Schischkoff -	44 20 0	141 37 0	"	657
		Risiri Island, or Pie de Langlo -	45 25 50	141 30 20	"	657
		Refunsi Island, Cape Guibert -	45 27 45	141 0 0	"	657
		Cape Romanzoff -	45 25 50	141 34 20	"	657
		WEST COAST OF NIPON.				
		Bittern Rocks, S.W. rock -	40 31 0	139 31 0	Richards, 1855.	658
		Tabu sima, East extreme -	39 11 53	139 34 17	Ward, 1859.	658
		Awa sima, N.E. extreme -	38 29 36	139 16 7	"	653
		Sado Island, Ya saki -	38 19 55	138 27 9	Richards, 1855.	658
		Niegata, governor's house -	37 58 51	139 9 45	Gouldsborough.	660
		Yutsi sima -	37 50 30	136 55 0	Richards, 1855.	661
		Nanao, entrance -	37 2 0	136 58 0	Gouldsborough.	661
		Astrolabo Rock -	37 35 0	136 54 0	Richards, 1855.	661
		Cape Noto -	37 28 0	137 22 0	"	661
		Mikuni Roads -	36 12 0	136 8 0	Gouldsborough.	662
		Tsuruga Bay, entrance -	35 39 0	136 4 0	"	663
		Oki Islands, North point -	36 30 0	133 23 0	Richards, 1855.	664
		Mino sima, centre -	34 48 0	131 9 0	"	664
		Cape Louisa -	34 40 0	131 36 0	"	664
		Richards Island -	34 32 0	131 18 0	"	664
		KIUSIU.				
		Wilson Island, summit -	33 54 30	130 24 30	Ward, 1861.	665

North Pacific.

d

	Lat. North.	Long. East.	Authorities.	Page
Swain Reef - - -	33 48 0	130 15 0	Ward, 1861.	667
Yobuko, Harbour entrance - -	33 33 0	129 49 0	Japanese MS.	668
Hirado or Firando, Harbour entrance -	33 23 0	129 28 0	"	669
Rock in North part of Obree Channel, summit - - -	33 21 30	129 26 11	Richards, 1855.	668
Yenoi sima, South side of - -	32 59 44	129 19 24	"	670
Hardy Harbour (Goto islands), Observation Islet - - -	32 49 0	128 56 39	"	671
Tama no ura, entrance of harbour -	32 43 30	128 38 0	Ward, 1861.	672
Cape Goto, extreme - - -	32 39 30	128 35 30	"	672
NAGASAKI, Minago Point - - -	32 44 28	129 51 58	"	677
Pallas Rocks, South rock - - -	32 14 17	128 12 30	Richards, 1855.	683
Meac sima (Kusa-saki) Ears peak - -	32 3 0	128 25 0	"	682
Nadieja Rocks, P. D. - - -	31 48 0	129 41 0	French chart.	
Retribution Rocks, centre - - -	31 20 0	120 46 20	H.M.S. <i>Retribution</i> , 1858.	682
Udsi sima, high peak - - -	31 12 0	129 29 0	French chart, 1846, corrected.	682

SECTION III.—THE ISLANDS.

Authorities.	Page
ard, 1861.	667
anese MS.	668
"	669
ards, 1855.	668
"	670
"	671
ard, 1861.	672
"	672
"	677
ards, 1855.	683
"	682
nch chart.	
M.S. <i>Retribu-</i>	682
n, 1858.	
nch chart,	682
46, corrected.	

	Discoverer.	Lat. North.	Long. West.	Authorities.	Page
ISLANDS BETWEEN THE EQUATOR AND LAT. 10° NORTH.					
Malpelo Island -		° 3 ' "	81 36 ' "	Aldham.	694
Rivadeneira Shoal -	Rivadeneira, 1842	4 15 °	85 10 °	Rivadeneira.	694
Cocos Island, Chatham Bay Obs.		5 32 57	86 58 22	Sir E. Belcher.	695
Walker Islands -	Walker, 1814	3 34 °	149 15 °	Walker.	697
Christmas Island, S.E. point -	Cook, 1777	1 40 34	157 13 53	Scott.	697
Washington Island -	Fanning, 1798	4 41 35	160 15 37	Wilkes.	701
Fanning Island, English Har- bour, flashing light	"	3 53 °	158 23 °	Richards.	699
Palmyra Island -	Sawle, 1802	5 50 °	162 23 °	Sawle.	731
Samarang Isles, West Islet	Scott, 1840	4 55 9	162 22 20	Scott.	702
Kingman Reef -	Kingman	6 27 30	162 21 °	mean.	702
Dinna Shoal -	English	8 40 °	157 20 °	English.	703
Baker Island -	Foster	0 12 30	176 22 °	Reeves.	703
Howland or Holland Island -	Belcher, 1842	0 50 °	176 35 °	mean.	705
GILBERT ARCHIPELAGO.					
Arurai, Arore, or Hurd Island	The <i>Elizabeth</i> , 1810	Lat. S. 2 40 54	Long. E. 174 40 49	Dutailis.	710
Nukunau or Byron Island	Byron, 1765	1 25 °	176 40 °	Gulick.	710
Onoatua or Rotcher Island	Clerk, 1827	1 50 °	175 39 °	"	711
Peru or Maria Island	"	1 20 °	176 11 °	"	711
Tamana Island -	"	2 25 °	176 7 °	"	711
Taputeouea, Bishop, or Drum- mond Island	Bishop, 1789	1 20 °	174 57 °	Wilkes.	711
Nanouti or Sydenham Island -	"	0 36 °	174 24 °	"	713
Aranuka or Henderville Island	Marshall, 1788	Lat. N. 0 11 °	173 39 20	"	713
Kuria or Woodle Island -	"	0 14 30	173 27 °	"	714
Apamama or Hopper Island	"	0 27 21	173 57 30	"	714
Mariana or Hall Island	The <i>Elizabeth</i> , 1809	0 56 45	173 4 15	Hudson.	715
Tarawa or Knoy Island	Marshall, 1788	1 29 °	173 5 °	Wilkes.	715
Maraki or Matthew Island	"	2 0 °	173 25 30	"	716
Apiang or Charlotte Island	"	1 52 °	173 2 °	"	716
Taritari or Touching Island	"				
S. point		3 8 °	172 48 °	"	717
Makin or Pitt Island, N. point		3 20 43	172 57 °	"	717
MARSHALL ARCHIPELAGO.					
Mili or Mulgrave Islands, anch.	Marshall, 1788	6 14 37	171 56 6	Dutailis.	720
Mujuro or Arrowsmith Islands	"	7 5 °	171 23 54	Chramtschenko.	721
Arhno or Daniel Island, E. pt.	"	7 27 °	172 7 °	Wilkes.	721
Pedder Island, W. point -	"	7 10 °	171 46 °	"	721
Aur or Ibbetson Islands, anch.	"	8 18 42	171 10 7	Kotzebue.	722
Malaelab or Culvert Islands,					
Kaven Island -	"	8 54 21	170 49 °	"	722
Erikub or Bishop Junction Id.,					
S. point -	"	9 6 °	170 4 °	"	723

	Discoverer.	Lat. North.	Long. East.	Authorities.	Page
Wotje or Romanzoff Islands.		" "	" "		
Christmas Harbour	Marshall, 1788	9 28 9	170 16 5	Kotzebue.	723
Likiep or Count Heiden Islands.					
N.W. point	Kotzebue, 1817	10 3 40	169 1 57	"	724
Jemo or Steep-to Island	Bishop	9 58 0	169 45 0	"	724
Mejit or New Year Island	Kotzebue, 1817	10 8 27	170 55 34	"	724
Ailuk or Tindal and Watts Id.,					
Capeniar Island	Marshall, 1788	10 17 25	169 59 20	"	724
Taka or Souworoff Island	"	11 11 20	169 50 37	"	725
Bikar or Dawson Island	"	11 48 0	170 7 0	Marshall.	725
Kongelab, Bigini, or Pescadore Islands	Wallis, 1767 ?	11 19 21	167 24 57	Hudson.	726
Rongerik or Rimski-Korsakoff Islands	Kotzebue, 1817	11 26 45	167 14 20	"	727
Bikini, or Eschscholtz Islands	" 1825	11 40 0	166 24 25	Kotzebue.	727
Wottho or Shanz Islands	Shanz, 1835	10 5 0	166 4 0	Shanz.	728
Kwajalein or Catharine Islands	The Ocean, 1804	9 14 0	167 2 0	"	728
Ujae or Lydia Islands	"	9 4 0	165 58 0	"	729
Namo or Margaretta Islands	"	8 55 48	167 34 0	"	729
Lae or Brown Islands	Brown, 1858	9 0 0	166 26 0	Brown.	729
Jabwat or Princessa Island	Dennet (?)	8 20 0	167 34 0	Dunn, &c.	729
Ailinglabeib or Musquillo Group, Lib, North Island	Bond, 1792	8 10 0	168 0 0	Chramtschenko.	730
Helut or Elmore Islands, South Island	The Elizabeth	7 15 0	168 46 0	"	730
Kili or Hunter Island	Dennet	5 46 0	169 0 0	Dennet.	731
Namarik or Baring Islands	Bond, 1792	5 35 0	168 13 0	Dennet (?)	731
Ebon, Boston or Covell Islands	Ray, 1824	4 39 0	168 50 0	Hagemeister.	731
Eniwetok or Brown Group, North Island	Butler, 1794	11 40 0	162 15 0	Lutke.	732
Ujilong or Arrecifos Island, cen.	Providence, 1811	9 39 0	161 8 30	Kewley.	733
THE CAROLINE ARCHIPELAGO.					
Kusaie, Ualan, or Strong's Id.,					
Coquille Harbour	Crozer, 1804	5 21 20	163 1 0	Duperrey.	739
Pinglap or Mac Askill Islands,					
North one	Musgrave, 1793 (F)	6 12 50	160 47 20	"	742
Mokil or Duperrey Isles, Aoura,					
N.E. point	Duperrey, 1824	6 41 45	159 50 0	"	742
Ponapi or Sényavine Islands,					
Ikono Kiti Harbour	Lutke, 1828	6 48 0	158 26 0	Reynolds.	747
" Ant or Andema Group,					
South extreme	"	6 43 10	158 5 30	Lutke.	751
" Pakin Group, Kapenoar	"				
Island, W. point	"	7 4 40	167 56 30	"	751
Ngatik or Valientes Islands,					
East extreme	Tompson, 1773	5 47 30	157 32 0	"	752
Nukuor or Monteverde Islands,					
East point	Monteverde, 1806	3 51 0	155 0 54	D'Urville.	752
Greenwich or Constantin Id.	Greenwich, 1826	1 4 0	154 47 55	Montravel.	753
Decapolis Reef	Decapolis, 1859	0 32 0	152 51 0	Decapolis.	753
Oraluk or Bordelaise Island	Saliz, 1826	7 39 0	155 5 0	Saliz.	753
Dunkin Island (?)	Dunkin, 1824	8 50 0	154 10 0	Dunkin.	754
Losap or D'Urville Island	Duperrey, 1824	7 3 40	152 42 20	Duperrey.	755
Mortlock Isles, Lukunor, Port Chanisseo	Mortlock, 1793	5 29 20	153 58 0	Lutke.	756

TABLE OF GEOGRAPHICAL POSITIONS.

Authorities.	Page	Discoverer.	Lat. North.	Long. East.	Authorities.	Page
Kotzebue.	723	Nanoluk Group, N.W. Isle - Lutke	5 55 0	153 13 30	Lutke.	757
"	724	Truk or Hogoleu Islands, Pise Island - Duperrey, 1824	7 42 30	151 49 15	Duperrey.	758
"	724	" Givry Island - "	7 9 0	151 51 45	"	758
"	724	" Tsis Id., N.W. pt. - "	7 18 25	151 48 29	D'Urville.	758
"	724	Hall Islands, Mourileu Island - Hall	8 47 30	152 20 0	Lutke.	758
"	724	Lutke or East Faiu Island - Lutke	8 33 20	151 26 0	"	759
"	725	Namonuito Group, Piserarr Id. - Ibargoitia, 1801	8 34 20	152 32 30	"	760
Marshall.	725	Tamatam or Los Martires Ids. - Duperrey, 1824	7 34 0	149 29 0	Duperrey.	760
"	725	Poloat or Enderby Ids., Alet Island - Renneck, 1826	7 19 25	149 17 0	Freycinet.	761
Hudson.	726	Suk or Ibargoitia Island - Ibargoitia, 1799	6 35 0	148 22 0	Cheyne.	761
"	727	Pikelot or Coquille Islet - Duperrey, 1824	8 12 0	147 41 30	Duperrey.	762
Kotzebue.	727	West Faiu Islet - Torres	8 7 30	146 47 30	"	762
Shanz.	728	Satawal or Tucker Island - Wilson, 1793	7 22 0	147 6 0	Duperrey.	762
"	728	Lamotrek or Swede Islands - "	7 32 0	146 30 0	Lutke.	762
"	729	" Elato Island - "	7 30 0	146 15 0	"	762
"	729	Olimarao Isles - Lutke, 1828	7 43 30	145 56 45	"	763
"	729	Ifalik or Wilson Islands - Wilson, 1793	7 15 0	144 30 0	"	763
Brown.	729	Wolea Group, N. extremity - "	7 22 6	143 57 53	"	764
Dunn, &c.	729	" Raour Island, E. extrome - "	7 20 7	143 53 0	"	765
Chramtschenko.	730	Foraulep Island - Lutke, 1828	8 36 0	144 36 0	"	765
"	730	Fauripik or Kama Islands - Hunter, 1791	6 40 0	143 10 0	"	766
Dennet.	731	Sorol or Philip Islands - "	8 6 0	140 52 0	"	766
and (P)	731	Fuis or Tromelin Island - Tromelin, 1828	9 47 0	140 38 0	"	766
Hagemeister.	731	Ulithi or Mackenzie Ids., Egoi, East extreme - "	10 7 53	139 54 58	Wilkes.	766
Lutke.	732	" Mogmog Island - "	10 6 0	139 45 30	Lutke.	767
Kewley.	733	Yap or Eap or Unawb Island, North point - Hunter, 1791	9 37 25	138 7 50	D'Urville.	767
"	733	Hunter Reef - "	9 57 30	138 13 0	Hunter.	769
"	733	Ngoli or Matelotas Islands, N. extremity - Villalobos, 1545	8 35 0	137 40 0	Cheyne.	769
"	733	Palau or Pelew Islands, Ky-angle Isles - "	8 8 0	134 17 0	Douglas.	772
"	733	Babelthuap Island, E. extr. - "	7 41 0	134 40 0	MacLuer, &c.	773
"	733	Orolong Island, Errakong Harbour - "	7 11 0	134 21 0	"	775
Duperrey.	739	Pelelew Island, S. point - "	7 2 0	133 18 8	D'Urville.	775
"	742	Angaur or Niuur Island, S.W. point - "	6 53 55	134 5 24	"	775
"	742	St. David or Freewill Ids. - Warwick, 1761	0 57 0	134 21 0	Williams	781
"	742	Helen Reef, N.N.E. end - Seton, 1794	3 0 0	131 52 0	Pedersen.	782
"	742	Mariere or Warren Hastings I. - Hutchinson, 1761	4 19 30	132 28 30	McClellan.	783
Reynolds.	747	Anna or Current Island - Warwick, 1761	4 39 0	132 4 0	"	783
"	747	Sansoral or St. Andrew Islands - Padilla	5 20 0	132 20 0	Maury.	784
"	747	Tobi or Lord North Island - Lord North, 1781	3 8 0	131 8 0	"	784
Lutke.	751	—				
"	751	—				
"	752	—				
D'Urville.	752	ISLANDS BETWEEN LATITUDES 10° & 20° N.				
Montravel.	753	Clipperton Island, rock - Clipperton, 1705	10 17 0	Long. W. 109 10 0	Sir E. Belcher.	785
Decapolis.	753	Passion Island or Rock - Dubouage	17 11 0	106 21 0	Woolridge.	786
Saliz.	753					
Dunkin.	754					
Duperrey.	755	REVILLA GIGEDO ISLANDS: —				
"	755	Socorro or St. Tomas, Braithwaite Bay, landing place -	18 43 14	110 54 15	Sir E. Belcher.	787

TABLE OF GEOGRAPHICAL POSITIONS.

	Discoverer.	Lat. North.	Long. West.	Authorities.	Page
St. Benedicto or Nublada Id.,		" " "	" " "		
North end -	Villalobos, 1542	19 22 40	110 44 0	Colnett.	788
Roca Partida -		19 4 30	112 4 0	"	788
Santa Rosa or Clarion Island,					
Sulphur Bay -		18 20 36	114 40 19	Sir E. Belcher.	789
Johnston Islands, W. islet -	Johnston, 1807	16 44 48	169 39 35	Brooke.	790
			Long. E.		
Smyth Island, N.W. extreme -	Smyth, 1807	14 41 30	168 50 15	"	791
Wakes Island -	Wake, 1796	19 10 64	166 31 30	Wilkes.	792
MARIANA OF LADRONES IDS.:-					
GUAM OR GUAHAN ISLAND,					
Umata Bay, church -		13 17 44	144 39 0	D'Urville.	799
Point Facpi -		13 19 50	144 37 30	Freycinet.	799
Port San Luis d'Apra, Fort					
Santa Cruz -		13 25 45	144 39 27	"	800
Port Tarofoto -		13 18 9	144 46 14	Sanchez.	803
Ahayan Point -		13 14 0	144 43 40	Freycinet.	803
Santa Rosa Shoal (p. d.) -		12 30 0	144 15 0	Charts.	798
Rota Island -		14 9 0	145 16 30	Freycinet and	803
Aguijan Island, centre -		14 53 44	145 30 1	Malaspina.	804
Tinian Island, Anson's Road,					
village -		15 59 20	145 36 19	"	805
Saipan Island, Magicionne Bay		15 8 30	145 44 0	Vansittart.	807
Farallon de Medinilla -		15 59 20	146 0 0	Sanchez.	810
Anataxan Island, centre -		16 20 0	145 39 0	Freycinet, &c.	811
Sariguan Island -		16 41 0	145 47 0	Sanchez.	811
Farallon de Torres or Zelandia					
Rocks -	Foster, &c.	16 51 0	145 50 0	Foster.	811
Guguan Island -		17 16 50	145 50 15	Freycinet.	812
Alamagan or Alamaguan Id. -		17 34 0	145 51 0	"	813
Pagan Island, N.E. end -		18 7 0	145 52 0	Sanchez.	813
Agrigan Island, S.E. pt. -		18 46 20	145 41 45	Wilkes.	814
Asuncion Island, crater -		19 45 0	145 30 0	Sanchez.	815
Urracas Islands -		20 6 35	145 20 0	Freycinet.	815
Guy Rock, or Farallon de Pa-					
jaros -	Douglas	20 30 0	145 8 40	Sanchez.	815
Britomart Reef -	Bartlett, 1869	19 18 0	141 34 0	Bartlett.	816
Lindsay Island, p. d. -	Lindsay	19 20 0	141 8 30	Lindsay.	816
Florence Shoal -	Wadsworth	18 6 0	143 18 0	Wadsworth.	816
SANDWICH ISLANDS,					
ETC.					
HAWAII, Kapoho Point -			Long. W.		
Nanavalie -		19 34 0	154 54 30		828
Hilo, Waiakea, or Byron's Bay,		19 38 0	154 57 0	U.S. Ex. Expedn.	828
Cocos Nut Island, light -					
Laupahoi -		19 43 51	155 3 0	Malden.	829
Mauna Kea Volcano -		19 54 0	155 6 0	U.S. Ex. Expedn.	833
Upolu Point -		19 54 0	155 28 0	"	827
Kuwaitae Bay, light -		20 19 30	155 58 30	"	833
Mauna Huahali -		20 2 20	155 55 30	"	835
Kailau or Kairua Bay, N.W. pt.		19 44 0	155 55 0	"	827
Kealakekua Bay, Kamehameha's		19 39 0	156 5 30	"	836
Tomb -					
" Cook's monument -		19 28 30	156 0 0	"	837
Mauna Lea Volcano, Pendulum		19 28 0	155 55 5	Thompson, 1837.	837
Peak -					
South Point -		19 28 0	155 35 0	U.S. Ex. Expedn.	827
		18 54 0	155 39 0	"	840

TABLE OF GEOGRAPHICAL POSITIONS.

xxxi

Authorities.	Page	Discoverer.	Lat. North.	Long. West.	Authorities.	Page
Colnett.	788	Kilauea Volcano -	19 25 0	155 21 0	U.S. Ex. Expedn.	827
"	788	MAUI, Hana Point -	20 40 0	156 3 0	"	840
Sir E. Belcher.	789	" Mauna Haleakala -	20 42 0	156 18 0	"	841
Brooke.	790	" Wailuku (Isthmus), N. side -	20 55 0	156 28 0	"	841
"	791	" Lahaina, light -	20 53 0	156 35 0	"	841
Wilkes.	792	" Kamalea Bay, N.W. pt. -	20 45 0	156 31 0	"	843
"	792	Molokini Island -	20 37 0	156 30 0	"	844
"	792	Kahului, S.E. point -	20 33 0	156 32 0	"	844
"	792	" Kealaikahiki, or W. point -	20 31 30	156 43 0	"	844
D'Urville.	799	Lanai Island, Cape Kamaiki -	20 42 0	156 57 0	"	844
Freycinet.	799	" Point Kaena -	20 57 0	157 7 0	"	844
"	800	Molokai, Halawa, or E. point -	21 9 0	156 45 0	"	845
Sanchez.	803	" Kalaau, or W. point -	21 6 0	157 18 0	"	845
Freycinet.	803	OAHU, Cape Makapua -	21 20 0	157 39 0	"	845
Charts.	798	" Waimea Bay -	21 39 0	158 4 0	"	845
Freycinet and	803	" Kaena Point -	21 36 0	158 15 0	"	848
Malaspina.	804	" HONOLULU, Wharf -	21 18 0	157 55 0	Raper.	849
"	805	KAUAI or Atooi, Kaloa point -	21 48 0	159 28 30	U.S. Ex. Expedn.	852
Vansittart.	807	" Waimea Bay -	21 56 0	159 43 0	"	853
Sanchez.	810	" Point Mana -	22 4 0	159 53 30	"	854
Freycinet, &c.	811	" Hanalee, village -	22 14 0	159 31 0	Sir E. Belcher.	854
Sanchez.	811	Niihau or Oneow, Kawaihoa point -	21 45 0	160 17 0	U.S. Ex. Expedn.	855
"	811	" Oku Point -	22 0 0	160 48 30	"	855
Foster.	811	Lehua Island or Oreehoua Id. -	22 2 0	160 9 0	"	856
Freycinet.	812	Kaula or Tahooria Island -	21 39 0	160 35 0	"	856
"	813	Nihoa or Bird Island -	23 5 0	161 45 0	"	856
Sanchez.	813	ISLANDS AND SHOALS, NORTH OF LAT. 20° N.				
Wilkes.	814	Los Alijos Rocks -	24 57 25	115 45 20	Du Petit Thouars	858
Sanchez.	815	Guadalupe Island, West islet -	29 10 50	118 18 30	Vancouver.	858
"	815	Reed Rocks -	37 35 0	137 30 0	Redfield.	859
Bartlett.	816	Necker Island, centre -	23 35 0	164 40 0	Brooke.	860
Lindsay.	816	Arabia Shoal -	29 30 0	155 50 0	Arabia.	861
Wadsworth.	816	French Frigates Shoal, islet -	23 46 0	166 16 10	Brooke.	861
"	816	Brooks Shoal, 14 fathoms -	23 52 0	166 46 0	Brooks.	862
"	816	Gardner Island -	25 8 0	168 1 30	Stanikowitch.	863
"	816	Maro Reef -	25 31 0	170 37 30	Brooke.	863
"	816	Laysan or Moller Island -	25 47 17	171 52 47	"	864
"	816	Lisiansky Island -	26 0 0	173 57 0	Brooks.	865
"	816	Pearl and Hermes Reef, N.E. extreme -	27 55 30	175 46 0	"	866
U.S. Ex. Expedn.	828	Ocean or Curé Island, Sand Id. -	28 4 45	178 27 45	Reynolds.	868
"	828	Brooks or Midway Islands, Welles Harbour -	28 14 0	177 23 15	"	869
Mulden.	829	" Middlebrooks Island -	28 13 30	177 18 20	"	870
U.S. Ex. Expedn.	833	Krusenstern's Rock -	22 15 0	175 37 0	Lisiansky.	874
"	827			Long. E.		
"	833	Patrocínio or Byers Island (p.d.) -	28 9 0	175 48 0	Zipiani (?)	874
"	835	Marshall (or Jardines) Islands -	21 40 0	151 35 0	Marshall.	877
"	827	Margaret (or Malabrigos) Ids. -	27 20 0	145 45 0	Magee.	877
"	836	Grampus Ids. (p. d.) -	25 40 0	146 40 0	"	877
"	837	Arzobispo (or Bonin) Islands -			Coffin, 1824	
Thompson, 1837.	837	" Parry Group, North rock -	27 45 0	142 7 0	Becchey.	880
U.S. Ex. Expedn.	827	" Kater Island, North rock -	27 31 0	142 12 0	"	880
"	840					

	Discoverer.	Lat. North.	Long. East.	Authorities.	Page
Arzobispo Islands, Peel Island, S.W. islet		27 2 0	142 10 0	Beechey.	881
" Port Lloyd, Ten-Fm. Hole		27 5 35	142 11 31	"	882
" Bailey Island, South islet?		28 30 0	142 13 0	"	884
Volcano Islands, San Augustino	Torres, 1543	24 14 0	141 20 0	Krusenstorn.	887
" Sulphur Island		24 48 0	141 13 0	King.	887
" S. Alessandro or North Island		25 14 0	141 11 0	"	887
San Mateo, Moor Island, or Sylph Rock		31 27 0	145 40 0	(?)	
Rosario or Disappointment Id.	<i>Nautilus</i> , 1801	27 13 0	140 46 0	Quin.	888
Linda or Euphrosyne Rock	<i>Linda</i> , 1851	21 43 30	140 50 0	<i>Linda</i> , &c.	888
Douglas Reef or Parece Vela	Douglas	20 30 0	136 10 0	mean.	888
Nautilus Rocks, or Vela	Bishop, 1796	25 20 0	131 15 0	Bishop.	889
Rasa Island	, 1807	24 26 40	131 1 50	mean.	890
Kendrick Island	Kendrick	24 35 0	134 0 0	Kendrick.	890
Borodino Isles	Ponafidin, 1820	25 56 0	131 15 0	Ponafidin.	890
Yakuno sima, Mount Motomi		30 21 0	130 29 0	Cecille.	891
Seriphos Rock		30 44 0	130 45 0	"	891
Yerabu sima, highest peak		30 27 0	130 11 0	"	891
Take sima, centre		30 48 0	130 24 0	"	891
Iwoga sima, highest peak		30 42 0	130 17 0	"	891
Powhattan Reef	<i>Powhattan</i>	30 41 0	130 19 0	<i>Powhattan</i> , 1860.	891
Trio Rocks, centre rock		30 45 0	130 5 0	French chart, 1846	891
Kuro sima, centre		30 50 0	129 55 0	"	892
Ingersoll Rocks, highest		30 51 0	129 26 0	"	892
LINSCHOTEN ISLANDS.					
Blake Reef, highest rock		30 5 0	130 3 0	Cecille.	892
Kutsino sima, summit		29 59 0	129 55 0	"	892
Kohebi sima		29 53 0	129 36 0	"	892
Hebi sima, peak		29 55 0	129 32 0	"	892
Naka sima, peak		29 53 0	129 50 0	"	893
Fira sima		29 41 0	129 31 0	"	893
Suwa sima		29 38 0	129 42 0	"	893
Akuisi sima		29 27 0	129 35 0	"	893
Sima-go Islands, highest		29 13 0	129 19 0	"	893
Tokara sima		29 8 0	129 11 0	"	893
Yoko sima, summit		28 49 0	128 59 0	"	893
THE LU-CHU OR LOO-CHOO ISLANDS.					
Sandon Rocks	<i>Viscount Sandon</i> , 1850	28 44 0	129 38 0		893
Oho sima, Harbour or Bunga- low Island, North end		28 31 40	129 40 12	U.S. chart.	893
" South end		28 6 30	129 22 0	"	894
Tok sima or Crown Island	Broughton, 1797	27 44 0	128 59 0	"	894
Yerrabu sima or Wukido		27 14 0	128 33 0	Collinson.	894
Great Lu-chu, Napha Kiang bridge		26 12 30	127 41 30	Beechey.	895
" Deep Bay		26 35 35	127 59 42	U.S. <i>Vandalia</i> .	898
MHIACO-SIMA ISLANDS.					
Tai-pin-san, Port Hadding- ton, S.W. point		24 43 35	125 17 49	Sir E. Belcher.	903
Hoa-pin-su, North side		25 47 7	123 30 30	"	904
Raleigh Rock	HMS Raleigh, 1837	25 57 0	124 2 0	"	904
Recruit Island	Lyll, 1861	25 57 40	124 43 0	mean.	904

Salvador, and Costa Rica. The Federal District, which up to 1839 was common to them, was a circle round the capital, San Salvador, 20 miles in diameter, with a further extension of 10 miles to the South, so as to include its port, the roadstead of Libertad, on the Pacific.

The N.E. coast of the isthmus, that is, the West India part, was discovered by Columbus in 1502. The greater portion of it was usurped by the Spaniards by 1524, and it was erected into a captain-generalship by the Emperor Charles V. in 1527. From the fact of its being only a minor state, its expenditure was on a less magnificent scale, and consequently comparative benefit accrued to the people. On the overthrow of the Spanish power, Guatemala became independent in 1821, and was subsequently incorporated with Mexico; but when Iturbide fell, it separated, and declared its independence on July 1st, 1823, adopting a constitution drawn up for it by Mr. Livingston, the U. S. statesman. Affairs were, however, far from settled, and much internal commotion continued; but all Spanish influence was thrown over at Omoa, September 12th, 1832. Notwithstanding its very great geographical importance, the resources of the country have hitherto been very imperfectly developed.*

Mountains.—In describing the general physical features of the country, these naturally become the first in order, influencing as they do the rest of its surface.

The elevated range (a continuance of the Andes) in Central America has no determined name, and is in many parts without a visible existence. It commences in Costa Rica, at a distance from the Pacific of about one-fourth of the whole breadth of the isthmus, and, at the beginning of this course,

* The principal authorities for any description of Central America are the works of Padre Thomas Gage, an English friar, 1632, an excellent and interesting work; that of Don Domingo Juarros, a native of Guatemala, in 1780, which has been translated by Lieutenant Bailey, R.M., 1823; Thomson's Visit to Guatemala in 1825, gives an excellent account of much of the interior; Reise naar Guatemala, 1829, by J. Haefkens, and a work by the same author, *Centraal Amerika*, 1832, both useful; *Narratives, &c.*, by Mr. Roberts, chiefly on the Atlantic side; a paper in the *Geographical Journal*, vol. vi., 1836, on *Costarica*, by Colonel Don Juan Galindo (an Englishman); *Diccionario de las Indias Occidentales*, by Col. Don A. de Alcedo; *L'Isthme de Panama, &c.*, by M. Michel Chevallier; the important works of Capt. Sir Edward Belcher, the *Voyage of the Sulphur* and the *Voyage of the Herald* by Dr. Seemann; the *Reconnaissances Hydrographiques* of Capts. de Lapelin and de Rosencot, 1854 and 1857. Upon its antiquities and general information, the works of Dupais, Waldeck, Kingsborough, Rouchaud, and Dumartray, may be consulted. One of the most interesting is that by Mr. Stephens, who describes the ruins in Yucatan, but who passed through portions of the other republics. The most important work is that which contains the various papers by Mr. E. G. Squier, 1858. The work of Capt. Bedford Pim, R.N.; the Travels of Dr. Scherzer, and the numerous reports issued by the engineers and explorers of the various inter-oceanic canals and railroads, which have been so industriously brought before the world. These are all noticed in the *Appendix*.

separates this state from Veragua; in Nicaragua it inclines close to the borders of the Pacific, leaving the lakes on the East; in Honduras it returns towards the Atlantic, leaving the whole state of Salvador on the South; traversing Guatemala, the new city and Chimaltenango stand on the top of the ridge, which now becomes more elevated as it approaches Mexico, and, branching into various groups, forms, in the western part of the state, that region which is demonstrated the highlands. The population on the Pacific side of the chain is much greater in proportion to its extent than on the Atlantic slope.

The chain is apparently interrupted in its course through Central America by the transversal valleys containing the Lake of Nicaragua and the plain of Comayagua, but still the elevation between the two oceans is considerable, and will be more dwelt upon when we describe the proposed canals, which would render Central America of very great importance in the commercial world, should they ever be carried into execution.

The Lakes of Nicaragua and of Leon, or Managua, are among the most important features of the country. On the Pacific side, the rivers which are met with rarely have their sources above 60 miles from the sea. The Lempa is the principal, but is not navigable. The next in size is the Rio Choluteca, falling into the Bay of Conchagua.

Although not possessed of good harbours, yet it is still superior to Mexico in this respect. The principal on the Pacific coast are, Realejo, Calderas, La Union, Libertad, Acajutla, and Istapá or San José.

Volcanic phenomena are frequent, and their devastating effects have been, at times, very severe. The principal volcanoes now, or recently, in activity, are those of Copeguina, Isalco, de Agua, and de Fuego, and many others; of these the Volcan de Agua is the loftiest, being differently stated as 14,895 or 12,620 feet above the Pacific.

These volcanic cones, often separated from the general chain, and sufficiently lofty to be visible 20 leagues off, are most magnificent land-marks, and are thus most important aids to navigation. There are usually *eight* of these volcanoes in activity—Isalco, las Pilas, Atitlan, Fuego, San Miguel, Momotombo, Orosi, and Cartago. Of these the first, Isalco, is an excellent beacon light, which overtops Sonsonate; las Pilas is of recent formation, thrown up in 1850, and although it has been in full eruption cannot be seen from the offing. The rest of these volcanoes generally emit only smoke.

The *productions* of Central America are important. The Tisingal gold mines, near the Chirique Lagoon, on the Atlantic side of Costa Rica, have afforded as much riches as those of Potosi; but the vegetable productions are of greater importance than the mineral. Of cultivated articles, cocoa, indigo, coffee, sugar, and cotton, are the most prominent. These crops vary with the height of the country. At a lower elevation than 3,000 feet, indigo, cocoa, sugar, and cotton are grown. Cocoa is chiefly grown

along the shores of the Pacific, and that of Soconusco was esteemed by the Spaniards to be the best furnished by their American possessions. Indigo is general throughout the country. Cochineal, or the nopal cactus, is cultivated between the heights of 3,000 and 5,000 feet, particularly in the neighbourhood of Guatemala. Of native woods, &c., abundance is produced, but principally refer to West India trade.*

The TRADE on the coast of Central America, which is almost exclusively British, is increasing rapidly. At Puntas Arenas, in the Gulf of Nicoya, excellent *coffee* is exported, and is the best coffee in the Pacific; at Realejo, *dye-wood* (Brasil-wood), &c.; at La Union (Gulf of Fonseca), *indigo*, &c.; at Sonsonate, *indigo*; and at Istapá or San José, *cochineal*.

Climate.—The whole of Central America is situated between the tropics; but the temperature and salubrity of its climate are as variable as are the diversities of its abrupt elevations, mountains, plateaux, ravines, sands, low districts, lakes, and forests.

The country is within the zone of the N.E. trades, which, sweeping across the Atlantic, reach the continent almost saturated with vapour. The portion of moisture which is deposited on the Caribbean Islands is probably quite restored to them in passing over the Mexican Gulf, and is then precipitated on the eastern slope of the high mountain ranges of Guatemala, Honduras, and Costa Rica, giving rise to a multitude of streams and rivers, and causing all that face of the country to be a dense and almost impenetrable forest of rank vegetation, unfit for the home of civilized man, and still occupied by the same wild tribes that were found at the discovery of the New World.

On the Pacific side, however, the trade wind still blows, for the mountains are not sufficiently high to intercept their entire violence, but it is deprived of much of its moisture, and thus the climate is very different to the Atlantic side. The climate is comparatively cooler, much drier, and consequently very much more healthy.

It is rare to witness an entire day of rain, even in the rainy season, although sometimes, but rarely, a rain of several days' duration occurs, which are called by the Spaniards *Temporales*.

On the sea-coast of the Pacific, the seasons correspond with those of the table lands, but the temperature is much hotter. It is said that the Pacific shores are healthy, although they are almost entirely covered with woods. This salubrity is, however, not without exceptional districts.

On the coast, during the fine season, which commences in November and ends in May, the land and sea breezes blow alternately, with a clear sky and but little rain; strong winds rarely occur during this period, except at the

* "This country is so pleasing to the eye, and abounding in all things necessary, that the Spaniards call it Mahomet's Paradise."—Gage, 1660, p. 165. An interesting account of the author's twelve years' residence in it will be found in his curious and valuable book.

ERICA.

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Islands is probably quite
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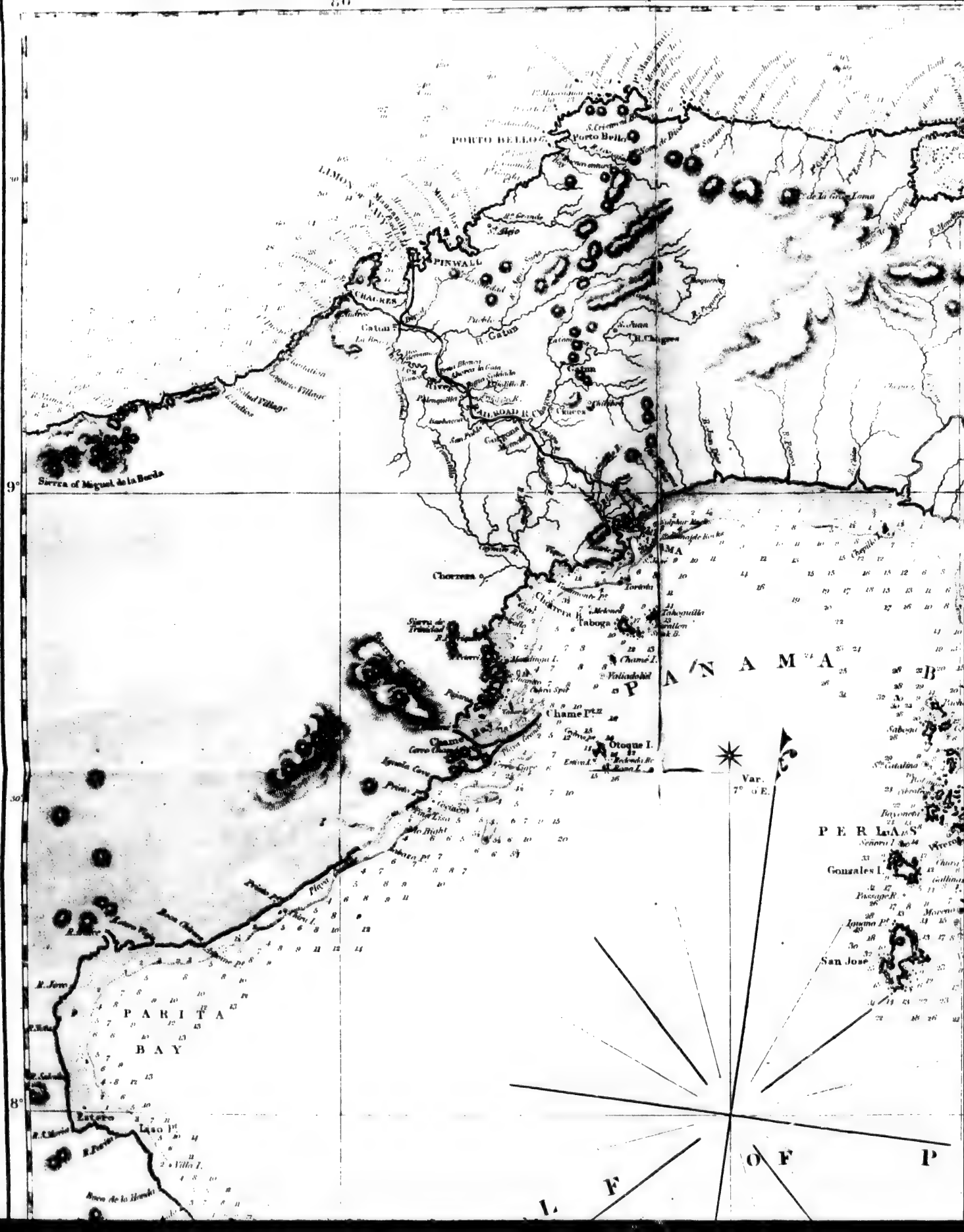
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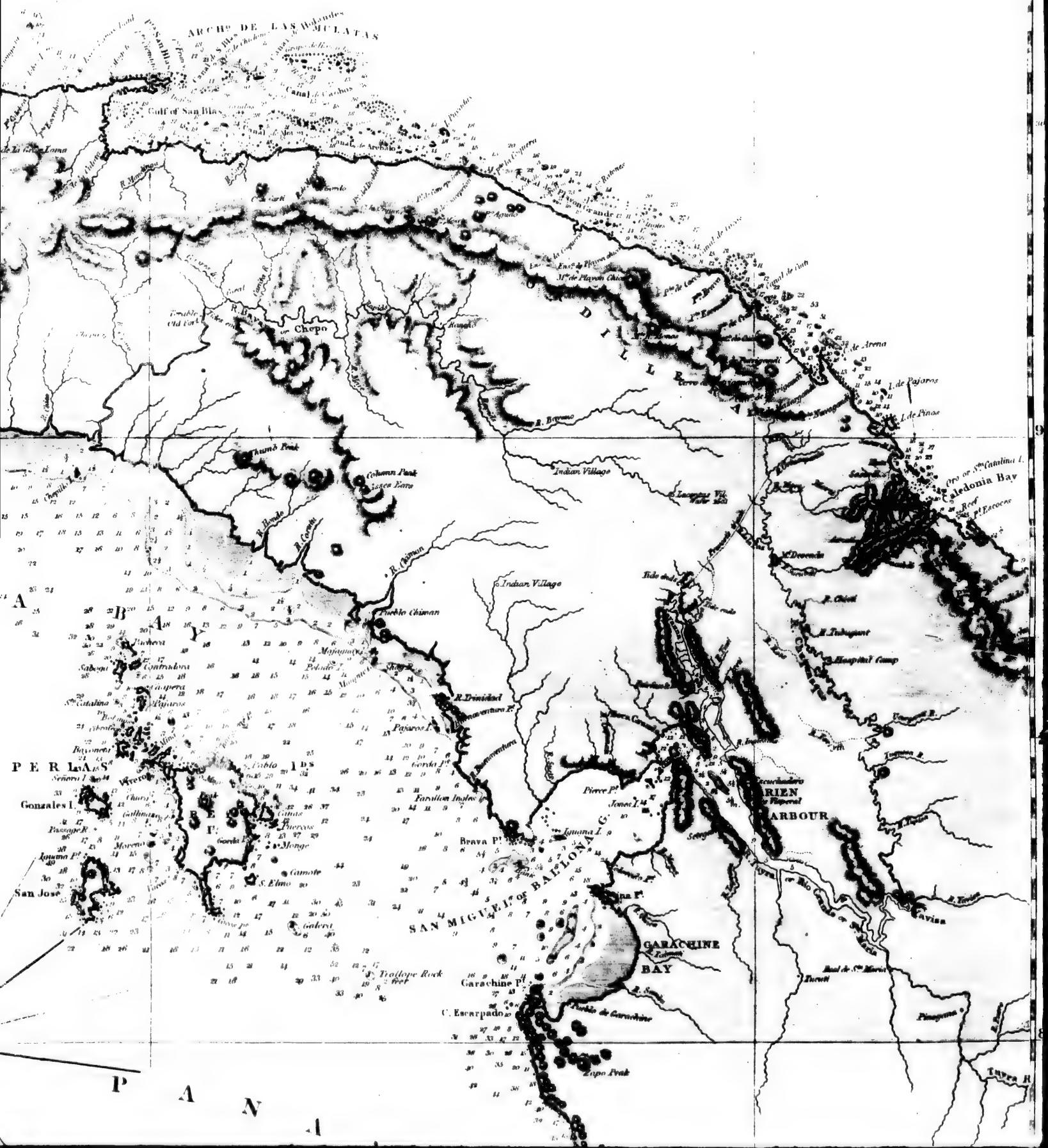
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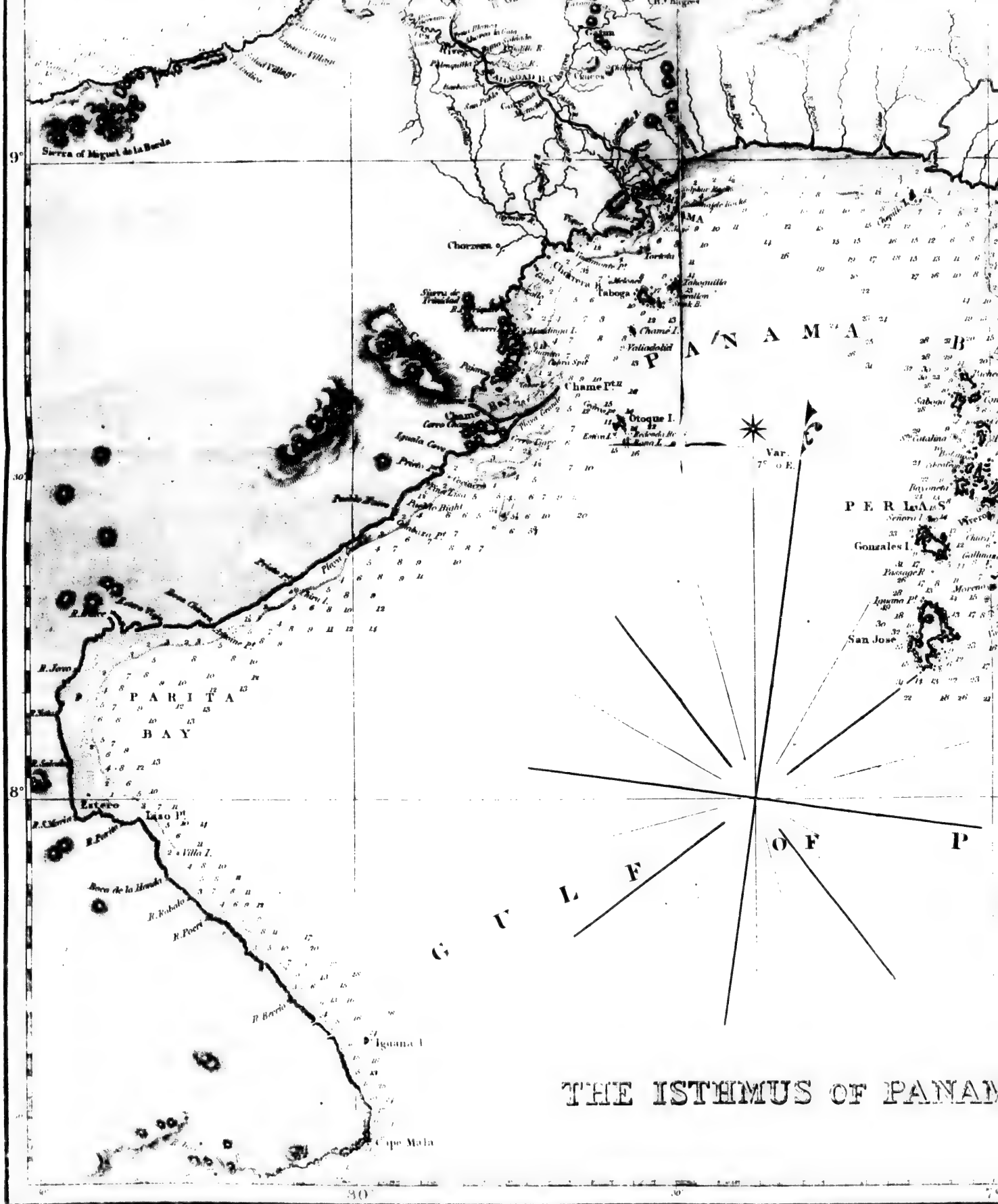
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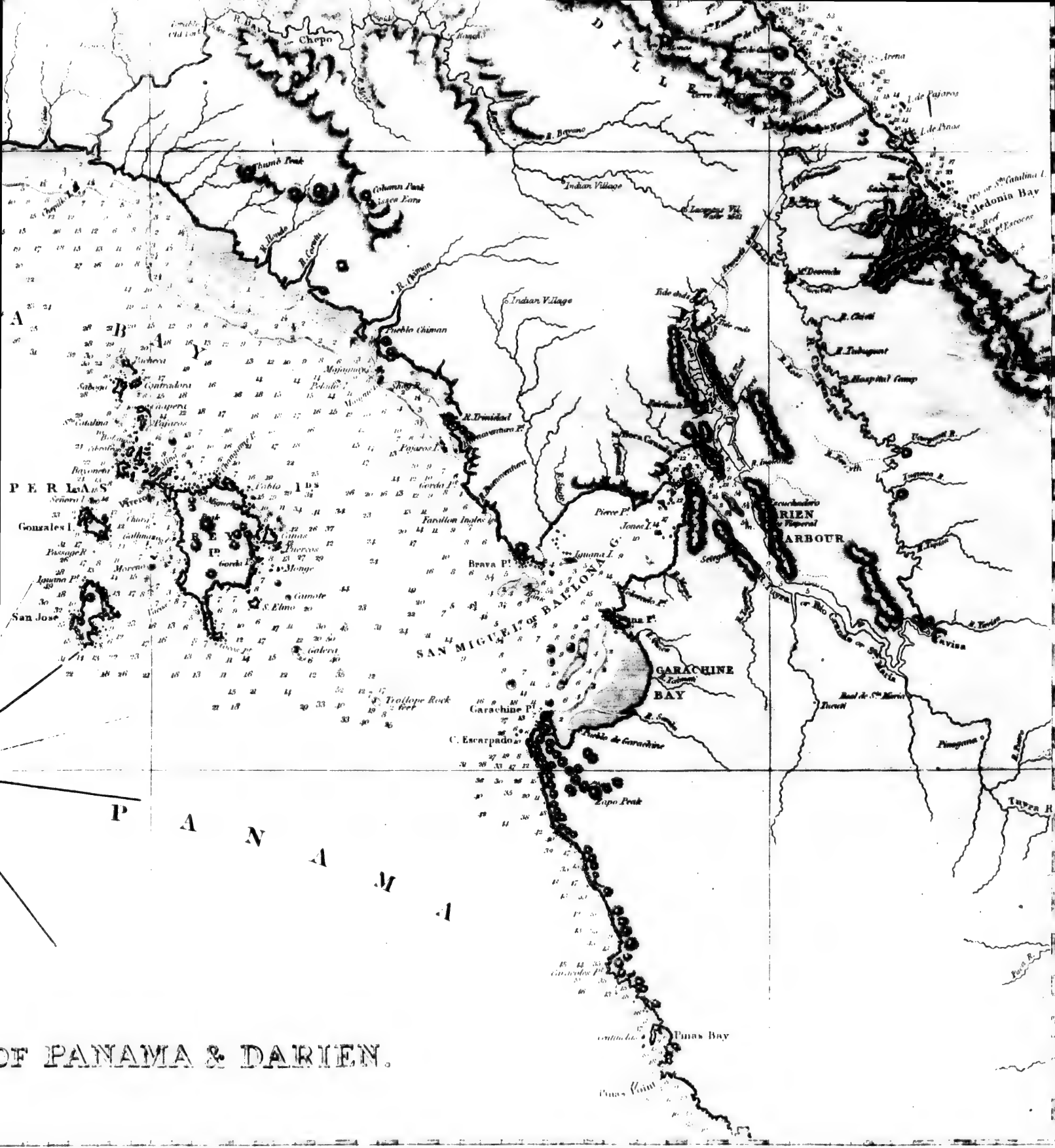
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In the rainy season, May to November, heavy rains, calms, light variable breezes, with a close sultry atmosphere, heavy squalls, with thunder and lightning, and not unfrequently strong gales from the S.W., are prevalent.

During the fine season, the land and sea breezes set in regularly; the former are called *el Terral*, and the latter *la Virazon*. The only winds to be guarded against at this season are the northers. These violent gusts give no warning but the noise created by them a few moments before they burst; sometimes a thick fog sets in beforehand, which is dissipated at the first gust. These gusts are more frequent near the Gulf of Tehuantepec or abreast of the Gulf of Papagayos.

In the rainy season calms are frequent, and the sea and land breezes which are felt on fine days, have no regularity. The prevalent winds then are from S.E. to S.W., blowing strongly and in squalls, bringing bad weather and torrents of rain for twelve or fourteen days at a series. During this season nearly every afternoon about 3 or 4 o'clock, a violent gust sets in from the N.E. and lasts till daylight. These gales are called *chubascas*, and resemble the tornados of the African coast.

On the coast of Central America the *currents* are variable, but almost always setting to the S.E., sometimes rather strong. The land wind never blows far off shore, and, except in the harbours, is not certain; the sea breeze is seldom felt, but there are of course exceptions.

Population.—The inhabitants of Central America comprise three classes: whites, or creoles of Spanish race; mestizos, or the offspring of whites and Indians; and aboriginal natives. There are but few negroes or Zamboes.

There is considerable difficulty in arriving at a true estimate of the population of the isthmus in the absence of any official data. Mr. Squier has carefully considered the question, and from various authorities he assumes that the total number of inhabitants of the five states as 2,108,000, distributed thus:—Costa Rica, 135,000; Nicaragua, 300,000; San Salvador, 433,000; Honduras, 350,000; and Guatemala, 890,000, San Salvador being much the most densely populated. Of these 100,000 are whites, 800,000 of mixed white and coloured races, Ladinos, Mulattoes, &c., 19,000 negroes, and 1,189,000 Indians.

1. THE COAST OF NEW GRANADA; PANAMA TO POINT BURICA.

In our volume descriptive of the South Pacific Ocean, the directions for the coasts of South America terminate with the Gulf of Panama. And this, although it lies eight degrees North of the Equator, will be a fitting commencement for our present work, as it is really the first point touched on by

the transit trade from the Atlantic side. We therefore repeat from that work those directions which refer to this portion of the New Granadian coast.

Garachiné Point on the East, and Cape Mala on the West, may be taken as the limits of what is called the Gulf of Panama. These points lie E.N.E. and W.S.W., *true*, 103 miles apart. The depth of the gulf within this line is about 80 miles, the city of Panama being at its head. Panama Bay is the space between the main and the Pearl Archipelago.

Until the survey of 1849, by Captains Kellett and Wood, R.N., we were dependent for our knowledge on the old but excellent Spanish charts, and on the still singularly correct description given by Dampier, nearly two centuries since.

The BAY OF SAN MIGUEL, to the N.E. of Garachiné Point, on the eastern side of Panama Gulf, was well known to the Buccaneers, who used it as the entrance to the Pacific in their overland journeys from the Gulf of Darien, which they generally accomplished under 10 days. Since Dampier's time it has almost been forgotten until 1851, when the idea of a ship canal was suggested to connect it with Caledonia Bay, in the Gulf of Darien. This project, still under consideration, will be noticed in the Appendix. The entrance to the Gulf is $6\frac{1}{2}$ miles wide, between *Lorenzo Point* on the North, and *Patino Point* on the South.

Buey Bank, an extensive shoal, drying in patches at low water, on which a heavy sea breaks, is 6 miles in circumference, its inner edge lying nearly $1\frac{1}{2}$ mile from Lorenzo Point, but this passage should not be used, as there is only 10 feet water in it, and generally a heavy swell. A spit with 12 feet extends off its south-west end for $1\frac{1}{2}$ mile, and $4\frac{1}{2}$ fathoms only are found nearly 5 miles from it; vessels should not stand within that depth.

San Jose Bank, a dangerous shoal, 1 mile long by three-quarters of a mile broad, in the centre of which is the *Trollope Rock* with only 2 feet water, lies in the fairway of ships bound to Panama from the southward, being 16 miles from Garachiné Point and 9 from Galera Island, the south-eastern of the Pearl Islands. It is easily avoided either by keeping on the main shore until Garachiné Point bears to the southward of East, or by passing nearer to Galera Island, which may be approached as near as 2 miles, taking care of the shoal patch and rocks off its southern side.

The PERLAS or PEARL ISLANDS, also known by the names of *Islas del Rey*, *Islas del Istmo*, and *Islas de Colombia*, form an archipelago on the eastern side of the Bay of Panama, consisting of 16 islands and several rocks. *Isla del Rey* is the largest, San José, Gonzales, Casaya, Saboga, and Pacheca are of secondary, and the rest of minor importance. There are from 30 to 40 fishing villages scattered about these islands, containing about 2,000 inhabitants, chiefly engaged in the Pearl fishery, which is said to produce about two gallons of pearls a year; the shells also form a lucrative article of commerce. These islands are low and wooded, the soil fertile, but not much

cultivated; most of them belong to merchants at Panama, who employ negroes to plant and cultivate them.

Pacheca, Saboga, and Contadora, with the islets of Bartholomew and Chipre, are a group in the northern part of the archipelago, forming between them a good and capacious harbour, well suited as a depôt for steamers. Pacheca and Contadora are covered solely by palm trees, unmixed with any others, which is singular. Saboga, the largest island, on the East side of which is a considerable village, has a reef extending $1\frac{1}{2}$ mile to the northward, which, with Chipre to the southward, forms the western side of this harbour. Pacheca and Bartholomew being on the northern, and Contadora on the south-eastern side; the latter island has 5 fathoms close to its north-east shore, which is low and well adapted for wharves.

This harbour is about 2 miles long by nearly 1 broad, with an average depth of 9 fathoms; it has three entrances, each possessing a 5-fathoms channel, which may be used as best suited to wind and tide. It is high water, full and change, at Saboga Island at 4^h, the rise and fall being 14 feet.

Vessels using the *Pacheca Channel* should pass within half a mile of the small island West of Pacheca, and stand to the southward until the centre of Bartholomew Island bears E. by S. $\frac{1}{2}$ S.; steer for it on this bearing until the northern islets off Saboga open westward of Saboga, bearing S. by W. $\frac{1}{2}$ W., when the vessel may haul to the southward for Contadora. If entering by the Contadora Channel, a ship should pass half a mile to the eastward of Bartholomew Island and not stand to the westward before the nearest islets North of Saboga open northward of Saboga, bearing W. by S. $\frac{1}{2}$ S., which leads through. Care must be taken not to open them too much, as there is a 2-fathom patch to the north-east of Contadora to be avoided.

Vessels from the eastward using the *Saboga Channel* should pass half a mile eastward of Contadora, and continue standing to the southward until the outer islet on the reef South of Saboga opens southward of the same island, bearing E. $\frac{1}{2}$ S. Steering on this course will clear the vessel of the sunk rock in this channel, which lies nearly 1 mile to the southward of Contadora, and when Pacheca is shut in by Saboga, bearing N. $\frac{1}{2}$ W., you may stand to the northward, and run through the channel which is steep-to on both sides. If this harbour were used, a few buoys would greatly assist the navigation.

Chapera and Pajaros lie next to the southward; there is a 4 fathoms channel between them, but the ground is foul and it should not be used. No vessel should attempt the passages South of Chapera Island, between it and Isla del Rey.

Casaya, Bayoneta, and Viveros, with several islets and rocks, are the largest islands on what may be termed an extensive reef stretching off from

COAST OF NEW GRANADA.

the north-west point of Isla del Rey, about 8 miles long by 5 broad, the passages between them being foul with occasional strong tides. A shoal $1\frac{1}{2}$ mile long by three-quarters of a mile wide, having only 9 feet water on its shoalest part, lies nearly 4 miles to the eastward of the North point of Casaya. The whole of these islands should be avoided by vessels bound up the bay.

ISLA DEL REY, the main island of the group, is about 15 miles long by 7 broad, with several peaks on it, the highest being about 600 feet above the sea. Numerous islets, having deep water between them, lie off its western shore, extending 3 miles from the coast, but they should not be approached by strangers within the depth of 10 fathoms. *Cocos Point*, its southern extreme, is a remarkable promontory jutting into the sea, 4 miles long by about 1 wide, its extreme cliff being crowned by an umbrella-like tree, which makes it conspicuous. East of this point is the fine *Bay of St. Elmo*, with convenient anchorage in all parts, and a good stream of water at Lemon Point, in the bight of the bay.

The eastern shore has also islands off it, but they are steep-to, and may be approached within half a mile, with the exception of Canas Island, at the eastern point, where there is a 3-fathom patch lying outside a sunk rock nearly $1\frac{1}{2}$ mile from the shore.

San Miguel, the principal town of these islands, on the North side of Isla del Rey, is of some size, possessing a conspicuous church; it is, however, badly situated, landing being difficult at low water. Two hills—the Cerro Congo and Cerro Vali—lie to the southward of it, the former being 481 feet high. Supplies are uncertain and dear, being generally all sent to Panama. Care must be taken in approaching it, as the bottom is irregular and rocks abundant.

GALERA, a small island, generally the first land made by vessels bound to Panama, is $7\frac{1}{2}$ miles to the south-east of Cocos Point, like which it is remarkable for its umbrella-tree. A cliff forms its southern side, sloping down to a beach on the North, and to the southward a reef runs off for nearly 1 mile. This island should not be approached within the depth of 10 fathoms, but there is a good passage between it and Cocos Point, by using which the vessel will be clear of the San José Bank.

GONZALES lies on the West side of Isla del Rey, with a broad deep channel between it and the islets before mentioned. It is about 12 miles in circumference, and has on its northern side two bays protected from the North by the Islands of Señora and Señorita. These bays, called *Perry* and *Magicienne*, are divided by the little peninsula of *Trapiche*, off the East point of which is a rocky ledge, terminating in a shoal, with 14 feet water.

A large stream of water runs into the sea on the western side of Magicienne Bay. This bay, however, is small and shoal, without the advantages of Perry Bay, which is 1 mile wide, and runs back for the same distance.

Gonzales was purchased in December, 1857, by the British Government of an American citizen for £1,000, the New Granada Government consenting, and retaining the sovereignty. No building was to be erected on it, but a vessel was to be moored. It was intended as a watering station for H.M. fleet. *Senora* and *Senorita*, including the shoal off their eastern side, are about one mile long, and lie nearly the same distance northward of Trapiche, with a 7 fathoms channel between, steep-to on both sides.

It is high water, full and change, in Perry Bay, at 3^h 50^m; the rise being 16 feet. The tide stream is not felt in the anchorage, but there is a considerable set off the island, the flood setting to the northward, and ebb to the southward, the latter being generally the stronger.

San Jose Island lies 4 miles directly South of Gonzales; the summit forms a table land. Nearly 2 miles S.E. from the Iguana Point, the northern extreme of the island, is a large waterfall, running into the sea, and forming an excellent watering place.

Passage Rock is a dangerous sunk rock, with 12 and 9 fathoms alongside of it, lying near the centre of the channel, between San José and Gonzales, which otherwise is deep and clear. It is 1½ mile from Gonzales, and 2½ miles from San José. Vessels should keep between the San José shore and this rock.

The COAST.—*Brava Point* forms with *Lorenzo Point*, from which it is distant 2 miles, the northern point of entrance to the Gulf of San Miguel. Both these points are edged with reefs and outlying rocks.

Farallon Ingles is a small but high island, lying at the edge of the shoal off the river Buenaventura, about 5 miles to the northward of *Brava Point*; 12 and 15 feet water are found on its western side. *Gorda Point*, bold and woody with 4 fathoms close to, lies 4 miles northward of the Farallon; there is less swell after passing this point. The *Pajaros* are two small rocky islets 4 miles from *Gorda Point*, with 4 and 5 fathoms to the westward, but only 13 feet between them and the shore. At these islets the 5 fathoms shoal commences, which continues in front of the coast round the Bay of Panama as far as *Point Chamé*, on its western shore. The *River Trinidad*, 2½ miles from the northern islet, has a low rocky point forming its south-west point of entrance. A 3 fathom channel was found into this river, extending 1½ mile from the point. *Shag Rock*, a barren islet, frequented by birds, with shoal water round it, lies 2½ miles from this entrance. *Mangué* and *Majaguay*, 7 miles from the River Trinidad, are high wooded islets at tide time. There is a depth from 10 to 12 feet water to the westward of them. *River Chimán*, to the northward of these islands, is wide at the mouth, but shoal, being nearly dry at low water. On the eastern side, under a hill, is the small town of *Chimán*. This was the spot to which Pizarro retired in 1525, after beating about for 70 days with much danger and incessant fatigue,

without being able to make any advance to the southward. He was here joined by Almagro, and the following year they sailed again for Peru.

Pelado Islet, W. by N. 4 miles from Mangue islet, directly off the mouth of the River Chiman, is a flat level islet of small extent and about 60 feet high; it has no trees, but is covered with a coarse prickly shrub; is steep-to on all sides, and forms a useful mark to vessels bound up the bay for Panama, who need not go inshore of it.

Chepillo Island, 31 miles from Pelado, is described by Dampier as the most pleasant island in the Bay of Panama; it lies off the mouth of the *River Chepo*, about 2 miles from the coast, and is one mile long by one-half broad, very fertile, being low on the North side, and rising by a gentle ascent towards the South, over which is a remarkable tree. This tree also forms an excellent mark to vessels bound up the bay; the southern point may be approached within a mile, but the other sides are shoal, a reef running off its northern point in the direction of the river. The coast between this island and Pelado is low river land with mangrove bushes.

The land North of these rivers is of some elevation. *Column Peak* and *Asses Ears*, about 12 miles North of *Chiman*, and *Thumb Peak*, at the West extreme of the range, are conspicuous.

Chepe River extends some distance into the interior of the isthmus, having its rise near the head of the Savannah river. The entrance is to the eastward of Chepillo Island, through a 10 feet channel, about 3 cables broad. Vessels should stand no nearer than 6 fathoms between Chepillo and Panama.

PANAMA.

PANAMA is one of the "Gates of the Pacific," and from the very earliest times has held an important position in the connection between the Old World and the Pacific. For within a year of the discovery of the great ocean a town was established in its vicinity.* During the Spanish occupation of these regions, it was periodically the scene of much activity, as the plate-fleet from Lima, with numerous merchant vessels with goods and treasure, came every three years for their transport across the isthmus to Porto Bello. This continued, more or less, to the downfall of the Spanish power in America, but was also seriously affected by the establishment of a regular commerce round Cape Horn. With the growth of trans-oceanic steam navigation it began again to revive, but the gold diggings in California

* "Nata, on the West side of the Bay of Panama, was the first town built by the Spaniards on the coast of the South Sea. It was founded in 1517. The following year they established themselves at Panama."—Herrera, *Historia de las Indias Occidentales*, dec. 2, lib. iv. chap. 1.

suddenly brought it into prosperity, which was wonderfully enhanced by the completion of the railroad in 1855.

Immediately about Panama, East along the coast, and N.W. from it, the land is low and flat, but West and N.E. the mountains approach it closely; and from a hill called *Cerro Ancon*, about a mile West from the city, and 540 feet high, an excellent bird's-eye view is obtained of the whole adjoining country, including the city, the island in the bay, the neighbouring plantations, the mountains of Veragua, the Pearl Islands, the flat country towards Chagres, the elevated chain between Porto-Bello and Panama, the Rio Grande, the low land along the coast towards the Pacora and Chepo, Panama Vieja, &c., all which come successively under review, and together constitute a landscape beyond measure beautiful.

The city consists of two parts, the city proper of San Felipe, occupying the peninsula, and the suburb of Santa Ana, on the isthmus. It is at the latter that the railway terminus is, and therefore the city has not benefited so much by the traffic it brings, as the greatest part of the merchandize and passengers do not enter the city. Panama suffers much from want of proper drainage, which is inexcusable, as there are such facilities in the great rise of tide. Of late years it has somewhat improved in this respect, but in other regards the same indolence and inactivity are evident in the ruinous public buildings, and want of enterprise that were so manifest of old.*

Panama affords the usual supplies which are to be obtained in tropical regions, but are generally dear; provisions of excellent quality may, however, be obtained from the United States by ships requiring them; and, when time will admit of it, getting such from the States is far preferable to purchasing in the markets of Colon or Panama.

Water can be obtained at Panama from the tank of the United States' mail steamers; but it is cheaper at Taboga, where it may be purchased at two dollars a tun. Coal may be bought here at times from the mail companies, but it is generally dear. Consuls of all nations reside at Panama.

On board ship Panama is by far the most healthy place on the coast of Central America. Vessels of war have remained here many months at a time, their crews continuing in a healthy state, excepting those men who had the will and opportunity to indulge in the vile spirit (*aguardiente*) of the country, which is cheap and easily procured.

The RAILROAD which connects the two shores of the isthmus was originated by three American merchants. Mr. Stephens, well known by his writings and researches in Central America, and Messrs Aspinwall and

* See voyage of H.M.S. *Herald*, by Berthold Seemann, vol. i, pp. 84—6, and 231—248; also, "The Gate of the Pacific," by Captain Bedford Pim, R.N., 1863, p. 208, et seq., and the Handbook to the Panama Railroad, by Dr. F. N. Otis, 1867.

Chauncey. The former gentleman made a preliminary examination in 1848, and then the partners entered into a formal contract with the Government of New Granada for the exclusive privilege of constructing a railway across the isthmus, and the company was secured from competition for 49 years by the government guaranteeing that no other iron railroad or maritime canal should be sanctioned.

The work was commenced in January, 1850, and was finished on January 28, 1855, under the able superintendence of Colonel G. M. Totten. Its total length is 45 miles 3,020 feet; it runs on the right or easterly bank of the Chagres from the Atlantic terminus, as far as Barbacoas, whence it crosses the river by a wrought-iron bridge, 625 feet long, in six spans. This is exactly midway between the two ends. The highest point is $37\frac{3}{4}$ miles from the Atlantic, and 263 feet above the mean sea level. There are no less than 134 culverts, drains, and bridges of 10 feet and under, and 170 bridges of greater dimensions. The line is only a single one, but there are four sidings at Gatun, Barbacoas, Matachin, and at the summit. The line is altogether constructed in a most masterly and perfect manner, and is maintained in the greatest efficiency by stations four miles apart. A most substantial electric telegraph is established between its termini. The total expenditure on the railway was 7,407,553 dollars—about £1,500,000 sterling. The fare across the isthmus is 25 dollars—£5 4s. 2d. sterling, or 2s. $2\frac{1}{4}$ d. a mile; only one class, one of the dearest travelling roads in the world. The time occupied is $4\frac{1}{2}$ hours, and the cost of fuel, exclusively wood, is 10 dollars for the double journey. From these high rates it has been a most profitable investment, 15 per cent. being acknowledged, but probably much more, for in 1857 it was 20 per cent. on the capital. The northern terminus, Aspinwall, or Colon, as it is termed in England, is a busy, thriving New England town, in great contrast to the Spanish Pacific terminus. The Panama Station is to the eastward of the city, and is connected with an iron pier 450 feet long, up to which the smaller steamers come for the transport of passengers and merchandise between the shore and the ocean steamers at Perico or Taboga. A longer pier and docks are very much wanted at Panama.

Petillo Point to the East of Panama, is a black rocky promontory with two small hills over it; rocky ledges extend from this point for $1\frac{1}{2}$ cables, and off their extreme a depth of 10 feet may be found. A great portion of this bay between this point and Panama is dry at low water springs, yet at its entrance there is a depth of 8 feet. It is termed *El puerto*, or port of Panama, and it is here that most of the minor trade of the Gulf is carried on by means of bongos, large canoes made from trees of such dimensions that some of them formed from a single trunk have measured 12 tons. *Buey Point*, only seen after half-ebb, forms the southern horn of this bay; the long rocky ledges extend $3\frac{1}{2}$ cables from the N.E. bastion, 5 cables from the S.E. bastion in an easterly and $2\frac{1}{2}$ in a southerly direction, forming a bay south-

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ward of Buey Point, in which is easy landing after half-flood, on a sandy beach in front of the Monk's gate. The general landing, however, is round Buey Point, at the market place on the northern side of the town. These ledges around the city, composed of rock with sand patches between, although now irksome and often dangerous to boats, afford every facility for erecting substantial piers and improving the port. As yet there is no attempt at works of this description.

The S.W. part of the Panama Road is embarrassed by rocks and shoals. Although these dangers are mostly above water, yet this part of the Bay of Panama should be avoided.

Perico and Flamenco, with the outlying rock of *San José*, are a group of islands forming the South side of Panama Road. *Ileña* and *Culebra*, the western and southern parts of Perico, are connected with it by an isthmus of beach and rocks; but at high water these present the appearance of three islands. These four islands are the joint property of the Panama Railroad and Pacific Mail Steam Ship Companies. Perico is the head quarters of United States mail steamers, the bay on its northern side forming a convenient anchorage, while on the isthmus, which is sandy on that side, steamers of 2,500 tons have been easily beached. Vessels using this anchorage after passing Flamenco, should keep close round the North end of Perico, and anchor when the isthmus opens. Large vessels drawing over 20 feet may coal at Perico, by passing West of the group at half tide, with Ancon Hill (which on that bearing makes like a cone), just open of *Ileña*, N.N.W., pass about a cable's length from *Ileña*, and anchor off its north-west end in 24 feet, when Perico opens. In both cases attention must be paid to the time of tide.

Danaide Rocks, a patch of conical rocks, on the eastern ridge of the road, with only 12 and 15 feet on them, surrounded by 3½ and 4 fathoms, lie E. by S. 2½ miles from the S.E. bastion. These rocks are awkwardly placed, lying in the track of vessels standing for the anchorage, keeping their luff with the land breeze. It is a favourite fishing place, and vessels should avoid canoes seen in that vicinity, as they are probably fishing on the rocks. *Sulphur Rocks*, a dangerous reef, one mile to the north-west of the Danaide, have a rock awash in their centre. *Knocker* and *Taboga Rocks* are two sunken rocks, with only 6 feet water on them; the former has a red buoy, with staff and flag on it, and lies nearly one mile E. ½ N. from the S.E. bastion; the latter lies a little more than 2 cables to the S.W. of the buoy, with 16 feet water between and 12 feet inshore of them, but no stranger should attempt to pass West of the Knocker Buoy.

Tides.—It is high water, full and change, in Panama at 3^h 23^m. The springs range from 18 to 22 feet, and the neaps from 6 to 10 feet. The ebb sets South from 1 to 1½ mile an hour, and is stronger than the flood, which runs to the N.W.

Directions.—Sailing vessels bound to Panama should endeavour to get within 3 or 4 miles of Chepillo Island, especially between December and June, and so have all the advantages of the prevailing northerly wind. From this point Ancon Hill will be seen, and should be kept a little on the port bow, as the wind hauls to the westward on approaching Panama. Vessels drawing over 18 feet should pass South of the Danaide Rocks, by not bringing San Jose on with the West point of Taboga (the largest of a group of islands about 9 miles South of Panama), bearing S.S.W., until the cathedral towers are open to the eastward of Ancon. Having passed the Danaide the ship is fairly in the road and may anchor according to her draught; if no more than 18 feet she may have Tortola just shut in by Ileñao, bearing S.S.W. $\frac{1}{2}$ W., and San José open East of Taboguilla, the eastern of the group above mentioned. Larger vessels, drawing 24 feet, may come to North of Perico, with the peak of Urava, the centre of the Taboga Group, on with the East point of Flamenco, bearing South, taking care not to open Changarmi northward of Perico. If it is necessary to work up the road to an in-shore berth, tack on the western side just before Perico and Flamenco touch, and in standing to the eastward do not open San José of Taboga Island.

Vessels drawing 14 feet may pass North of the Danaide and South of the Sulphur Rocks, with the Hermanos Rocks on with right side of the peak, between the rivers Grande and Falfan, then San José on with the peak of Taboguilla bearing S. $\frac{1}{2}$ E., leads between Sulphur and Knocker Rocks, and they may anchor North of the buoy in 16 feet, keeping it between Perico and Flamenco, with Gabilan, a rocky peninsula West of the town, just shut in by the S.E. bastion. During neap tides they may anchor still further to the N.W.

Panama Road, although shoal, may be considered secure; the ground being muddy holds well. A sailor, resident in Panama for five years, remarks, that during that time there was no known case of a vessel being driven from her anchors; and with good ground tackle and common precaution a vessel might lie there all the year round with one anchor down. Attention to the tides and soundings of the roadstead will enable a vessel to lie close in at times for the discharge of cargo.

TABOGA ISLAND, with those of *Urava* and *Taboguilla*, form a pleasant group of islands, about 4 miles long by 2 broad, lying 9 miles to the southward of Panama. Taboga, the highest and largest, 930 feet above the sea, is well cultivated, with a considerable village on its N.E. side. To the northward of the village is the Morro of Taboga, a small hill, connected with the main island by a low sandy isthmus, covered at high water. This place is the head-quarters of the Pacific Mail Company who have here a steam factory and coal stores, also a gridiron, 300 feet long, on which H.M.S. *Magicienne*, a vessel of 1,255 tons, was repaired in 1858.

Vessels visit Taboga from Panama to procure water and supplies, both of

which are more readily obtained than at the city. Water can be procured from the Company's tank at 2 dollars per tun. The anchorage formed by the Morro is convenient, being about 3 cables from the shore in 10 fathoms, with the peak of Urava on with high cliff of Taboga and the church from S.W. $\frac{1}{2}$ S. to West. Vessels coaling at this island should avoid giving liberty to their crews. There is a regular steam boat communication with the city.

Urava is a small, lofty island, separated from Taboga by a narrow and shoal channel; off its southern extreme is the small islet of *Terapa*. *Taboguilla*, 710 feet high, also well cultivated, with some islets off its S.W. extreme, forms the N.E. island of the group, with a wide and deep channel between it and Urava, in the centre of which is a sunk rock with 8 and 14 fathoms close to.

The coast from Bruja Point to Chamé Point, a distance of 46 miles, forms a shoal bay, with several outlying banks and rocky islets, and vessels bound to Panama should keep near the islands of Taboga, and not approach this shore within the depth of 5 fathoms. About one mile to the N.E. of Vique Cove is a lofty treble-peaked hill, called *Cerro de Cabra*, forming a conspicuous object to vessels bound to Panama, and frequently mistaken for Taboga by those coming from the eastward.

Chame Bay, at the head of which is a small river of the same name, is nearly filled up by large banks, of which the largest is the Cabra Spit, lying in the middle, with Tabor Isle on it. On the southern side is Chamé Point, a singular, low, woody promontory jutting into the sea, $5\frac{1}{2}$ miles long by half a mile broad. Between this and Cabra Spit is a convenient harbour, 2 miles in length by about three-quarters of a mile in breadth, with from 3 to 8 fathoms water in it, and from 16 to 18 feet, close to the beach of Chamé Point. To the north-west of the river is a high range called *Sierra Capéro*, and to the southward are the *Cerro Chamé*, a group of wooded hills.

Melones Island is a small rocky islet, $2\frac{1}{2}$ miles to the north-west of Taboga, with a rock above water, lying about half a mile to the northward of it. *Chamé Island*, with the *Perique Rock*, are of a similar nature, situated about the same distance southward of Taboga. *Valladolid* is a large rock nearly 2 miles to the south-west of Chamé Island, with 9 and 10 fathoms close to it.

Otoque and Bona, with *Estiva Island* and the *Redondo Rock*, lying 6 miles to the S.E. of Chamé Point, form a group similar but somewhat smaller than Taboga and Taboguilla, being cultivated, and having a considerable village, called *La Goleta*, in the bay on the western side of Otoque. Anchorage, in from 10 to 14 fathoms, may be found in any part of this group, and all dangers are above water.

PARITA BAY, large and open to the eastward, is nearly 20 miles across,

lying 45 miles to the south-west of Chamé Point. The coast between is a continuous beach, called Playa Grande, in front of a low wooded bank. Vessels from Parita Bay should shape a course to pass about 2 miles to the southward of Bona. The mud-flats are found again on the western side of Parita Bay.

Iguana Island, a little higher than the adjacent coast, and thus forming a conspicuous object, lies about 9 miles to the northward of Cape Mala. The island is steep-to, except at its South and East points, with 15 fathoms in the channel between it and the main. It is high water, full and change, at Iguana Island, at 4^h, the rise and fall being 15 feet.

CAPE MALA, which forms the western point of entrance in the Gulf of Panama, is a low but cliffy point with outlying rocky ledges, having deep water close to them. The land from the north-west slopes gradually down to the sea at this point from a considerable distance, making the exact cape difficult to distinguish, unless the breakers are seen. On opening the gulf round this a strong southerly set is generally experienced, especially in the dry season.

The **PROVINCE of VERAGUAS**, the western extremity of New Granada, was but little known till the surveys of Capt. Kellett and Capt. Jas. Wood in 1848—9, and Captain de Rosencot in 1854—7, made us acquainted with its coasts. Of the interior we are still almost as ignorant as were the early historians of Columbus. The relative poverty of the region has never attracted any attention, or raised any commercial products. The native population, chiefly Indian, does not exceed 50,000 in number. Some of these are occupied during part of the year in collecting pearls and pearl oyster shells, and also tortoise-shells, for which one or two vessels annually visit the different islands and harbours, of which that of David is the chief, the town being the capital of the province.

In front of the coast is an archipelago, or rather range of islands, running generally parallel with it, and leaving a channel, 10 or 12 miles broad, within the four groups which they form. The coast itself abounds in excellent and spacious harbours, and throughout landing is easy and safe. There are no barred rivers nor outlying shoals, but then there is little more than the vast primeval forest to visit.

Los Frailes are two remarkable rocks, the southern one of which is 12 miles S.W. $\frac{1}{2}$ S. from Cape Malay. They are $2\frac{1}{2}$ miles apart, in a N.N.W. and S.S.E. direction, and are bold-to. They are a good mark for approaching Cape Mala. In leaving the Bay of Panama, the cape should not be approached too closely, as the current shifts from its easterly direction to the S.W. outside it. The coast trends nearly due West from Cape Mala, and at $13\frac{1}{2}$ miles is the small island of *Benado* or *Venado*. Not far from this there is a commodious creek, according to native report, or river, accessible for vessels of any draught, having 10 or 12 fathoms depth, and affording a sup-

ply of fresh water. The coast beyond this trends to S.W. for 16 miles to Puercos Point, and then 27 miles W. by S. $\frac{1}{2}$ S., and terminates in Point Mariato, from which it bears to the northward.

The only outlying dangers are a shoal of 18 feet, lying $1\frac{1}{2}$ mile off shore, at 2 miles E. by N. of Point Puercos; and another reef, of some extent, a mile off shore, and 4 miles W.S.W. of Point Puercos. The rest of the coast is quite bold-to.

Mariato Point is in lat. $7^{\circ} 12' N.$, long. $80^{\circ} 51' 30'' W.$ It is bold and bold-to. At 5 miles N.W. by W. from it is a small wooded island, *Naranjas*, which has deep water close outside it.

The **BAY OF MONTIJO** is 23 miles northward of Point Mariato. It is an extensive gulf, in front of which is the long and narrow island of *Cebaco*, which nearly encloses it to the southward, and the channel to the westward of it is partly occupied by the island *Gobernador*. The bay is thus completely sheltered, but unfortunately the depths inside are so irregular, that it is useful only to vessels of small draught. There is a deep channel to the East of *Cebaco*, which shoals suddenly from 12 fathoms to 6, and then to $3\frac{3}{4}$ fathoms, at 4 miles North of the East point of *Cebaco*. Keep along the East side of the bay, taking care to avoid the rock *San Juan*, distant about $1\frac{1}{2}$ mile from the land, and also some others farther to the North, and you may thus reach *Leones Island*, at the head of the bay. There is another channel to the West of *Cebaco*, passing on either side of *Gobernador*, but that between *Gobernador* and *Brava Point*, on the North shore, is preferable, because the southern channel is narrower, and the tidal stream through it much stronger. In this western entrance to the bay a vessel should not go farther in than in 4 fathoms. There is good shelter for vessels of light draught under the West shore of the bay, which is easily reached. It is necessary to be very careful with the lead, on account of the steep banks which extend throughout the bay as far as *Leones Island*.

QUIBO or COIBA was surveyed by Captain James Wood, R.N. It is the largest of the islands off this coast, and is 60 miles in circumference. The interior consists of fine plains covered with magnificent forests, as yet untouched. In the fine season there are abundant streams, and there are numerous anchorages around its shores, but it possesses no harbour, properly so called.

It was a favourite resort in early times, as vessels coming to its bays were free from molestation, and its fine timber was much prized. Its western face is clear of danger, but there is a shoal nearly a mile in breadth against its southern extremity; and outside of this, $2\frac{1}{2}$ miles off the shore, is a dangerous 6-feet shoal, called the *Hill Rock*, which bears nearly due East $5\frac{1}{2}$ miles from David Point, the N.E. end of *Hicaron*, and the same distance S.W. by W. from *Negada Point*, the S.E. end of *Coiba*. There are several other rocks hereabout, but they are above water. *Hermosa Point* is

North Pacific.

the N.W. extreme of the island, and has deep water close outside the rocks and islets off it. To the East of it is an open bay *Hermosa Bay*, with a sandy beach. *Baltasar Head* is the North point of Coiba, and is 11 miles north-eastward of Hermosa Point.

Damas Bay, on the eastern side of Coiba, and 6 miles N.W. from its S.E. point, is the principal anchorage. It is about $6\frac{1}{2}$ miles wide, and has a broad sandy flat at its head, through which the waters of a small stream, the *Rio San Juan*, flow. There is good anchorage in any part of the bay, the depths gradually decreasing from 30 fathoms, between the two outer points to 10 or 12 fathoms, within a quarter of a mile of the sandy flats, which, as the tide rises and falls about 6 feet, must be guarded against. There is a narrow inlet between the reefs on the South side of the bay, with 6 and 7 fathoms water, which might, with care, afford protection from the S.E.

The island, as above said, is covered with a dense and tangled tropical vegetation, the undisturbed abode of birds, reptiles, and wild beasts. A visit to the land should therefore be conducted with caution.

In former times, when the system of reprisals against the Spaniards was so vigorously pursued by the buccaneers and ships of war sent by England, as related by Dampier, Woodes Rogers, Lord Anson, and others, Quibo was a point of very considerable importance, as affording means of shelter, and also water, near to the principal field of action against the Spanish galleons. In the account of Commodore Anson's voyage, the whole island is described to be of a very moderate height, excepting one part of it (near the N.E. end), and its surface covered with a continual wood, which preserves its verdure all the year round. Tigers, deer, venomous snakes, monkeys, and iguanas exist upon the island, a statement repeated by Captain Colnett (1794). In the surrounding sea, alligators, sharks, sea-snakes, and the gigantic ray abound. Pearl oysters, which attracted the pearl fishers from Panama, were also to be gathered from the surrounding rocks, and the huts of these men and the heaps of shells still existed at Colnett's visit. On the N.E. part of the island, Anson describes a cascade of very great natural beauty, a river of clear water, about 40 yards wide, rolling down a rocky declivity of near 150 in length.

Captain Colnett, who was here, as before stated, in February, 1794, anchored in Damas Bay (Port de Dames) in 19 fathoms, the North point of the bay in a line with the North point of Cebaco Isle, bearing N.N.E., the watering place N.W., and the South point of Quibo S.E. by S. He says:—"Quibo is the most commodious place for cruisers of any I had seen in these seas, as all parts of it furnish plenty of wood and water. The rivulet from whence we collected our stock was about 12 feet in breadth, and we might have got timber for any purpose for which it could have been wanted. There are trees of the cedar kind a sufficient size to form masts of a ship of the first rate, and of the quality which the Spaniards, in their dockyards, use for

every purpose of ship building, making masts, &c. A vessel may lay so near the shore as to haul off its water; but the time of anchoring must be considered, as the flats run off a long way, and it is possible to be deceived in the distance. The high water, by my calculation, is at half-past three o'clock. At full and change the flood comes from the North, and returns the same way, flowing 7 hours, and ebbing 5, and the perpendicular rise of the tide 2 fathoms.

Hicaron, which lies off the S.W. side of Coiba, 4 miles distant, is of a triangular form, and well wooded. Its highest point is on the East side, and is 830 feet high, an eminence that commands a prospect all over the adjacent islands, and the coast beyond. Off its South point is *Hicarita*, a small islet, covered with cocoa-nut trees. The channel between Hicaron and Coiba is of very irregular depth, but is safe and practicable.

Rancheria, or *Quibito*, is a small island $1\frac{1}{2}$ mile long, and $1\frac{1}{2}$ mile off the N.E. point of Coiba. To the S.S.E. of it is a sandy beach, where there is good anchorage, sheltered by a round and high islet. Wood and water are easily procured. A Frenchman formed a small settlement here on the South side. The channel between Coiba and Quibito is rocky and uneven, but is apparently safe.

Afuera, or *Canal Island*, 4 miles E.N.E. of Rancheria, is about midway between the North point of Coiba and the shore. It may be passed on either side, the only danger around it being a reef against its S.E. side, which has a black rock, always uncovered at its outer edge, 2 cables' lengths from the shore. The islet *Afuera* nearly touches Afuera on the North.

BAHIA HONDA, "deep bay," is well named, and is an excellent natural harbour. It is 23 miles N.W. from the West end of Cebaco, and opposite the North point of Coiba. Should that island ever rise into importance, Bahia Honda must be its port. It is easy of access, perfectly sheltered, wood and water abundant, and easily procured, and is so safe that a vessel may be hove down, or any repairs done, without fear or hazard.

It was surveyed by Sir Edward Belcher in the *Sulphur*, in 1839, and it was also examined in 1854 by Captain de Rosencourt, in the *Obligado*. Sir Edward Belcher says:—"On the 4th of March, 1839, we moved on to Bahia Honda; another of our stations in 1837. Here we fell in with a few Chiriqui Indians, sent to clear the land, but they were also very much afraid of having any dealings with us.

"We found this to be a most capacious, safe, and convenient harbour, completely landlocked, and perfectly adapted for refit, heaving out, &c., there being no tide or current. Water was in abundance at the beach, and nothing wanting but a town and civilization to render it a favourite resort; timber of every kind, and the best abundant. The islands at its entrance are beautifully adapted for defence, with but trivial labour. At this port we collected a large stock of parasitic plants in full flower, which continued

to decorate my cabin for some time, until forwarded to England, where they arrived in 42 days in good order.

Sentinela Island, which forms the southern point of the entrance, is in lat. $7^{\circ} 43' 32''$ N., long. $89^{\circ} 29' 1''$ W. It is small, and some rocks lie around it to the extent of about a cable. Captain de Rosencot also shows a detached reef, about 2 cables' lengths to the N.E. of it, which is not marked on Sir Edward Belcher's survey. A smaller islet, *Cono*, lies a short distance South of it, and both are separated by a narrow rocky channel from *Cape Jabali*. *Guarida Point* is the North point of the entrance, nearly a mile North of *Sentinela*, and the depth between is tolerably even all across, about 20 to 23 fathoms. This depth gradually decreases within the bay to 12 and 13 fathoms $1\frac{1}{2}$ mile within the entrance up to *Talon Island*, the highest point of which is only about 120 feet high, and bears E.N.E. from the entrance. *Talon* is rather more than half a mile long; off its N.W. point is a small island, *Pueril*; and off its South point is another, *Espuela*. These separate *Bahia Honda* into two anchorages, *Chinche Bay* to the westward, and *Legamo Bay* to the eastward, the former being more extensive. *Talon* has but a shallow channel to the North of it. The whole extent of the inner bay is about 3 miles from West to East. At 2 miles westward of the entrance is *Medidor Island*, and off the South end of this is *Trucha*, or *Pacora*, a smaller island, bold-to on the South side. Captain de Rosencot gives the following instructions for entering:—

In coming to this harbour, after having made out *Afuera* in mid-channel off it, the island *Medidor* will be seen. It is of moderate height, and must be steered for until the small islet, *Pacora* or *Trucha*, is made out, lying close to the South point of *Medidor*. There is a passage on either side of this islet, but it is best to leave it to port, as the northern channel is narrowed by the rocks off *Medidor*. Then steer for *Guarida Point*, or rather more to southward. The entrance to the bay is easy, although it does not make out well at a distance. To the right, close in-shore, is *Sentinela Islet*, which should be avoided on account of the rocks which surround it; and to the left is *Point Guarida*, which is quite clear, and may be ranged close-to. When past this point, bear up to port, and make for a round wooded islet, *Chinche*, lying in the N.N.W. part of the bay, and anchor in 11 to 14 fathoms, muddy bottom, sheltered from every wind.

The bay is separated into two parts by an island named *Talon*, to the West of the anchorage. The only population of the bay consists of a few Indian families on this island, from whom eggs, fowls, cocoa-nuts, and bananas, may be got at a cheap rate. They are also the most expert turtle catchers, and will furnish a large quantity daily. Fish also is abundant. To the eastward of the island the extensive mud-banks, which uncover at low water, leave only a narrow space for anchorage in $5\frac{1}{2}$ fathoms, but this is unimportant, as there is nothing to induce a vessel to come into this part of the bay. The

only dangers to point out are a rocky reef a little above the line joining Point Penot and Pueril Islet, at $1\frac{1}{2}$ cables length from the last; and another reef at the same distance North of Guarida Point, on which there are only 8 feet water. The *Obligado's* anchorage was with Point Guarida S. 40° W., Sentinela Islet S. 14° W., Espuela Islet, S. 83° E., Chinche Islet, West point N. 15° W. Captain de Rosencoat made the position of this anchorage of the *Obligado*, opposite Pueril, to be lat. $7^{\circ} 44' 52''$ N., long. $81^{\circ} 31' 0''$ W. High water, full and change, at $3^h 30^m$; tides rise 12 feet.

Water is abundant, and there is a stream, the *Arroyo del Cobre*, which can be ascended high enough in a boat to get good water; but the most convenient place is to the E.S.E. of the above anchorage, where there are two streams, which, with a hose, will fill the casks rapidly. Wood is abundant everywhere, the forests are magnificent.

Leaving Bahia Honda is as easy as its access. Keep on the side around Point Guarida, avoiding Sentinela Islet. The best time is in the morning, when the winds which precede the sea breeze come from E. to N.E. These are sometimes so light that you must tow out by your boats. Having doubled Point Guarida, steer for Trucha, leaving it to starboard, the same with Medidor, and not attempting to pass through the narrow and rocky channel which separates the latter from the land.

The **COAST** beyond Bahia Honda is a succession of bays of different extent, among which the three principal are *Monita, del Rosario, and del Pajaro*. The first is to the North of *Point Ventana*, a projection of which the extremity opposite Medidor Island is called *Punta Roble*. The bay itself takes its name from a woody islet on its northern part near the land. It is clean, but affords no shelter against westerly winds.

Bahia del Rosario is separated from the last by *Point Gorda*, the name of which is expressive of its massive character. It is recognisable by a small round islet in the middle of the bay, about a mile from land, called the *Muela*, or *Caballo*. The bay is included between Gorda Point and the *Punta del Muerto*, which terminates in an isolated pointed hill; between these points is that of Rosario, which gives name to the bay, and separating it into two parts, the southern of which is called *Pivay Bay*. At the head of each bay a stream debouches, but the anchorage is open to W. and S.W., and can only be used in the fine season. The third, or *Pajaro Bay*, is 9 miles from Medidor Island, and has 16 to 18 fathoms water. In each of the bays a few Indian families are found, who live by fishing and hunting.

The navigation along the coast thus far is quite safe close in; but to the North of *Pajaro Point*, the North limit of the bay, a long sandy shelf commences, the *Playa Brava*, which fronts the coast for 9 or 10 miles, and off the South end of which, at 2 miles from shore, is only 6 feet water, a bank apparently formed by the deposits brought down by the *Rio Lavenia*. At the

North end of this bank is the mouth of the *Rio Tucasera*, which has no bar. *Negrillo Bluff* is on the West side of the entrance.

The *Contreras* are two islets, with numerous rocks and islets lying 10 miles off this coast. The northern island is called *Brincanco*, and the southern *Pajaros*. They are $3\frac{1}{2}$ miles apart, and the southern island is 9 miles North of Coiba. There is no good anchorage around them. The *Obligado* anchored on the North side of Brincanco, off a small bay resorted to by the fishermen for turtle and pearl oysters; the bottom coarse gravel, and very bad holding ground. The islands are uninhabited. They may be approached without fear, the depths being 30 to 40 fathoms near them. The only danger is a moderately high rock, the *Farallon de Prosper*, which stands like a black tower, about 2 miles South from the South point of the Pajaros. It was so named from the wreck of a French ship *Le Prosper*, which was drifted on to it in a calm. Vessels should not pass between them, on account of several rocky patches.

PUEBLO NUEVO was surveyed by Sir Edward Belcher, in the *Sulphur*. In his book he says:—"Our first halt was Pueblo Nuevo, in March, 1839, at the mouth of the Santiago, or Pueblo Nuevo, at the island called by us *Magnetic Island*, in March, 1837. Here we recommenced our survey of this river, following its branches up for some distance. The river takes its name from a small village, situated on the river Santiago, where the Spaniards probably first appointed the seat of government. The port is formed by a neck or island about 3 miles in length, which affords good anchorage for vessels of any class. Three larger streams discharge themselves into the main basin at the western end of this island, where the apparent great entrance is situated, but so studded with rocks and shoals as to be unnavigable for anything larger than boats. It is, in fact, an extensive archipelago, as most of the regions towards the Chiriqui territory will be found to be on future examination.

A plan was made, which will prove interesting to those who may visit this port, for refuge or refit; but water cannot be procured in any quantity. It may probably be found by digging wells. The natives generally appeared alarmed at our presence, nor could we induce them to bring off supplies. Had our visit been prolonged, no doubt this would have been dispelled; as, after we fell in with a negro who understood English, they appeared anxious to sell pigs, poultry, &c.

Their principal article of trade is the sarsaparilla, that of this neighbourhood being esteemed of superior quality. The stream runs fresh at some miles up, but we did not either meet it or succeed in finding the town. Sugar cane of good quality was offered; and tortoise-shell, one of their articles of trade, can be procured at the season.

Sir Edward Belcher's survey was published 10 years later, and the place was again surveyed in 1854 by Captain de Rosencoat, who in his chart or

directions takes no notice whatever of his English predecessor, as is indeed the case throughout the French work. It would seem to have been scarcely necessary for the two nations to have surveyed this uncommercial region twice within so few years. What follows is derived from Captain de Rosencot's pamphlet, adapting it to Sir Edward Belcher's survey.

From whatever direction Pueblo Nuevo is approached, it is easily made out by the two hills or Morros, the *Cayado Hills*, on the South side of the entrance, which, at a distance, make like two islands. A conspicuous sugar-loaf hill, about 5 miles North of the entrance, is also a good mark, as it stands alone, and is 550 feet high. The two Cayado Hills are 300 and 400 feet high. On a nearer view, two low and wooded islands come in sight, *Silva de Afuera*, the *Magnetic Island* of Sir Edward Belcher, and *Silva de Tierra*, or *Silla Island*, which lie nearly East and West, 3 miles apart, in a line with the entrance of the bay.

The entrance of the river is formed by a low mangrove island, as before stated, which Captain de Rosencot calls *Porcada*. It is about 4 miles long N.W. and S.E., and has a former channel to the river to the N.W. of it, but this is now only passable by boats. The southern entrance is close around Cape Cayado, between that point and a spit projecting a mile to the W.S.W. from *Belitre Point*, the South extreme of *Porcada*, and which, as it uncovers at low water, acts as a breakwater to the channel. Cape Cayado is so named from its supposed resemblance to the form of a bishop's pastoral staff, or a shepherd's crook, and has 8 to 10 fathoms close up to its base. The channel here is not more than $2\frac{1}{2}$ cables wide, but the channel is straight, running nearly East and West, with 6 to 10 fathoms throughout.

It is necessary to have a commanding sea breeze and the flood tide to enter. Being a quarter of a mile due West of Cape Cayado, you will see a small round islet or rock in the middle of the inner basin. It is the *Intrusa* of Belcher, or the *Perdono* of de Rosencot. Keep close to the South cape, and steer for this islet, and proceed until it comes on with Belitre Point, the South cape of *Porcada*, bearing N. 28° E., when you may anchor in 7 to 9 fathoms, fine sandy bottom. Perhaps it is best to enter with the first of the flood, as then the edges of the banks are plainly seen, which is not the case so well near high water. You may pass quite close to *Intrusa*; but the banks to the eastward are very irregular in depth, so that vessels drawing more than 17 or 18 feet should be cautious.

The resident Indians say that the westerly winds which are frequent between June and October, send in a heavy sea to the inner anchorage; but in this case shelter may be found in the river itself within Belitre Point, and, if necessary, as high up as *Payo* or *Conejo Island*, which is a mile N.N.E. of *Intrusa*, to reach which, you must pass to the North of that island.

The only dangers here, beside the bank at the entrance, are the mud banks in the southern part of the inner bay; another bank to the southward

of Payo, and some rocks scattered on the bank abreast of the channel East of Payo, on which lies the small islet *Herron*, off the mouth of the river, or *Arroyo Tinto*.

Sir Edward Belcher places the Observation rock off the South side of Magnetic Island, or *Silva de Afuera*, in lat. $8^{\circ} 4' 39''$ N., long. $81^{\circ} 45' 30''$. Capt. de Rosencot makes *Perdono* or *Intrusa* Island to be in $8^{\circ} 4' 54''$ N., long. $81^{\circ} 43' 0''$. It is high water, on full and change, at $3^h 10^m$ or $3^h 44^m$; rise from 9 to 12 feet.

Good water may be procured from a brook which falls into the small bay on the East side of Cape Cayado. The bay is inhabited by a few Indians in ranchos or huts, scattered along the beach. Some eggs, fowls, vegetables, and tropical fruits may be obtained. There are a number of small villages on the numerous affluents which fall into the river, but by far the largest is on the stream which gives it its name. At one time it was on an eminence only 2 miles from the Boca Brava, and was then called *Los Remedios*,—a name still applied to the place, which is 15 miles from the harbour. The passage up to it is most intricate, and can only be found by native guidance. This "pueblo nuevo," or new town, has not more than 400 inhabitants, among which are a small number of Europeans, and in 1854 two Frenchmen, who had erected a saw mill. On all the islands and all visits to the shore, be exceedingly cautious against a most venomous species of serpent, which is very numerous, and whose bite is fatal.

Leaving Pueblo Nuevo is as easy as the entrance. It is best to have the land-breeze, and start a little before the end of the flood-tide. Having got beyond Cape Cayado, pass on to the southward of *Silva de Tierra*, and then take any route at pleasure. It is not advisable to pass inside *Silva de Tierra*, on account of a long spit of sand and rocks which extends from its North side.

From the northern entrance before described, on the north-western side of which is the low island *Espartal*, the coast trends to W.N.W. for 23 miles, for the first 18 of which it is composed of narrow sandy beach, behind which is a line of forest, intersected here and there by the mouth of a river, which are recognisable afar off by the whitened and bare trunks of the mangroves. About a dozen miles inland is a range of hills, the last steps of the Pacific Cordillera, between which and the sea is a wooded plain. Beyond the above limits the hills approach the sea coast, which is otherwise quite safe to approach by the lead at a distance of 2 or 3 miles. The coast then turns abruptly to S.S.W. for 4 miles, forming a peninsula, off the S.E. point of which are the *Benado Isles*, which consist of one larger island near the point, and three smaller on one bank farther to the eastward. *Point Ojo* of De Rosencot (the *El Juco Point* of Captain Wood) 3 miles West of the eastern Benado Islands, is the south-western extremity of a peninsula which forms the eastern limit of Chiriqui Bay.]

The SECAS ISLANDS lie on the meridian of 82° W. at 14 miles off the coast. The group consists of three principal islands, with numerous rocks and islets, one of which is 5 miles northward of their southern edge. With one exception the islands are quite safe, and they will afford shelter to a small vessel, and several of them are accessible, but there is no fresh water, as their name indicates. A vessel becalmed or at nightfall might seek shelter safely here when approaching David Bay in 12 fathoms, sandy bottom. At $2\frac{1}{2}$ miles N.E. of the largest island is a *rock awash* at high water, but which is quite uncovered at low water. It is called *La Bruja*. There is a wide-spread tradition that at the period of the Spanish conquest, some Indian refugees buried some treasures on the northernmost of the largest island, and this is in some measure borne out by the discovery of several ancient implements and other objects.

The Chiriqui coast, as this part is called by Captain de Rosencout, is fronted by a large group of islands, and with the numerous streams to the North of them, forming an intricate archipelago, to the North of which, by a tortuous channel, the approaches to the town or city of David are found. The various islands and channels are so united by almost a continuous shoal, nearly 20 miles in extent from East to West, that, as above said, the only safe access is from the eastern end of the labyrinth.*—Captain Wood.

CHIRIQUI or DAVID BAY lies between El Juco Point and *Palenque Island*, $5\frac{1}{2}$ miles asunder East and West. Off Juco or Ojo Point is an isolated rock known by a clump of trees on its summit, and the point may also be known by two small islands, *Silla* or *Ensellada*, which from the South have the appearance of a saddle, as the name indicates.

The *Viuda Rock* (the Widow) lies $3\frac{1}{2}$ miles to the southward of El Juco, and is a large flat rock, with a reef extending half a mile to the E.S.E. It is quite steep to on all sides, having from 8 to 13 fathoms all around it, and may be seen at a distance by day, as the sea breaks heavily upon it. At low water four pinnacles are uncovered, one only being visible at high water.

A *sunken rock* is said by the natives to lie rather to the West of the line joining the West end of Viuda Rock and the Secas, about midway between,

* The charts and directions for this part afford an example of what should be avoided. The island was well and carefully surveyed by Commander Wood in 1848, but this fine chart with all its details was not published till *thirteen years* later. In the mean time the French officers in the *Obligado*, commanded by Capt. Roux de Rosencout, also surveyed it, in 1854. The French survey has not the slightest allusion to its predecessor, and these two charts differ entirely in their nomenclature, &c., so that Capt. de Rosencout's directions are almost unintelligible when used with Capt. Wood's chart, which is quite sufficient of itself as a guide in this most unfrequented region. We have followed, in some degree, the French directions, giving Capt. Wood's names.

which would place it about 5 miles S.E. from the Viuda. It has been unsuccessfully sought for, but it was said to show but very rarely.

In coming from the East, do not pass to the northward of the Ensillada or Monitas Islands, on account of the strong currents. Leave them on the starboard hand, ranging close to them if desired. Coming here from the southward, take care to avoid the Viuda, and when abreast of it to the West, steer for the *San José Islands*, a cluster of four wooded islets united by a reef. These are also safe, except a spit which runs off their East point. Guarding against this, also keep a good lookout for another insidious danger, the *Buey Rock*. This rock is of small extent, lying in the middle of the bay, and uncovers at half tide, and does not show at all at high water and in fine weather; neither does the lead give any sign of its proximity, for the usual depth of 7 and 8 fathoms is found close up to it. It lies $1\frac{1}{2}$ mile N. 56° E. from the summit of San José, and $3\frac{1}{2}$ miles N. 64° W. from the Monilas or Ensillada. There is good anchorage to the N.E. of this in the fine season, but during the period when the S.W. winds prevail, it will be better to get under the lee of the San José Islands.

At the head of the bay is a line of islands running generally E.S.E. and W.N.W. According to Capt. de Rosencat their names are, going from East to West, *Monita* (this name is given by Captain Wood to the outermost cluster) *Mona*, *Carey* (Carré of Wood), *Bajo Rajado*, *Saino*, and *Ventana*; to the North of the last is the East end of the larger island, Brava, extending 7 miles to the westward, and along the northern face of which is the channel leading to David. The bay within this line of islands is inaccessible to ships. But it is probable that there is shelter between the second and third islands West of El Juco Point, which is called the Plaza Grande. At the head of this bay is another called the *Ensenada de Chuchican* or *Chuchegal*, on the plains around which are numerous herds of cattle, which can be purchased direct from the owners.

The *Boca Chica*, or entrance to the river, lies between Ventana and Saino. It may be known by some rocks on the extremity of the former, being pierced through by the sea at its base, so as to have the appearance of a window or ventana. The passage is very narrow, and in taking it keep close to Saino, and guard against the *Lavandera Rock*, which is quite covered at high water, lying $1\frac{1}{2}$ cable off Ventana. The water is very shallow within the point, and is quite unadapted for seagoing vessels, and cannot be taken without a pilot. Within, the anchorage is called *El Pozo* (the well), and from this can be seen the outer houses of the village of Boca Chica (or the *Puerto de San Lorenzo* of Capts. Kellett and Wood. It consists of about a score of ranchos or huts, surrounded by oranges and bananas. Fresh provisions, as butcher's meat, poultry, fruits, &c., can be bought here cheaply.

The watering-place is on the North shore of El Pozo, but it is not convenient, though the water is good. Capt. de Rosencat made the sandy Bay on

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the South side of Saino in lat. $8^{\circ} 11' 52''$ N., long. $82^{\circ} 12' 8''$ W. Greenwich.
The tides were regular, the greatest rise was 11 feet, the least 6 feet; high
water at $3^h 15^m$.

David is the chief town of the province of Chiriqui, and lies about 25
miles from the sea by the eastern channel, or 10 miles by the western one,
and to go thither in a boat a pilot is indispensable on account of the in-
tricacy of the channels. It stands in a fine plain, and is surrounded by
cultivated lands, which extend as far as the extinct volcano of Chiriqui.
The population is 5,000, and it has a regular trade with Panama, sending
thither by some small vessels pigs, poultry, eggs, vegetables, &c. The cattle
are generally driven to the market.

The situation of David has some importance from the fact that it stands
on the narrowest portion of the American isthmus, and on ascending the
Chiriqui volcano both oceans can be seen at once. An ordinary cart road
has been proposed as the modest substitute for a railway, which should lead
from Amiral's Bay on the Atlantic, a good harbour, to that just described.
Another feature of importance is the existence of a coal-field, which extends
nearly across. A portion taken from Muertos Island, near the entrance of
the river, was analyzed by Professor Rogers, which gave good results.

Palenque Island lies off the South side of Isla Brava, on the West side
of David Bay. The shoal water which limits the bay trends to the N.N.E.
and to W.S.W. from this island. Off its S.E. point is Deer Island, the S.W.
point was made by Captain Wood to lie in lat. $8^{\circ} 10' 13''$ N., long. 82°
 $13' 40''$ W.

The PARIDAS ISLANDS are a group at the western extremity of those
described as lying parallel to the coast and the chain of mountains which
runs through the isthmus. They consist of one large island, Parida, about
11 miles circumference at the West end; another, much smaller, Bolano or
Volano, near the eastern part of the cluster, and a crowd of islets and rocks
between the two. They are uninhabited, except during the season of the
pearl fishery, when a few people come to them.

Parida is well wooded but not high, and is the only one of the group that
affords water. According to Captain de Rosencot, the only anchorage is in
the N.E. of the largest island, and is sheltered by that point, and by another
small long island (*Isla Gami*), which shelters the road from the South, and
where there is a good sandy beach for landing, the depth 7 fathoms mud.
To reach this anchorage from the eastward, and being South of the Benado
Islands, steer westward for the North point of Parida, taking care not to
go into less than 5 fathoms on the port hand.

The islands which run to the eastward for 4 miles from the South end of
Parida terminate in Bolaño (or Volaño) and Baraco to the S.E. of it; these
are the largest, the others are unimportant. At three-quarters of a mile
South of Baraco are some rocks, and there is also another at $1\frac{1}{4}$ mile E.N.E.

of it. Midway between Bolaño and San José Island are a cluster called *Lenartes Islands* in Captain Wood's chart.

Chimmo Bay is at the S.W. end of Parida, and has a line of islands stretching to the N.W. from its southern point, the outermost of which is called Sta. Cruz. The watering-place in Chimmo Bay is in its N.E. point. There is a channel around the North end of Parida, but off the North end of the island it is very narrow, though deep.

From *Santa Cruz Point*, the S.W. end of Parida, to the *Boca San Pedro*, which is a more direct opening to the river leading to David, is 11 miles, the interval being occupied by banks over which the sea breaks heavily and the water very shoal. On the East side of the Boca San Pedro is the *Isla Sevilla*, separated from Isla Brava before mentioned, by the Boca Brava. On Sevilla abundance of game may be procured, deer, goats, &c. Although the natives say that the Boca San Pedro is practicable for boats, yet the French surveyors arrived at an opposite conclusion, and that the Boca Chica was the only one advisable.

The Coast between Chiriqui and Burica Point forms an extensive bay 34 miles wide. The north-eastern part of the bay is formed by a series of islands formed like those of Chiriqui just described. The island of *San Pedro* is the westernmost of those which belong to the River of David and the coast continues a regular curve, first to the northward of West and then to the southward, getting higher to the southward till it terminates in Point Burica.

There is no port or place of resort, although native report points out two or three spots of local importance; of these, *Guanavano*, at the entrance of a river about 15 miles North of the point, is one; another is *Charco Azul*, also at the mouth of a river some miles to the South of it. These places, and the coast generally, are quite safe as open anchorages.

The Ladrones (or Zedzones of Colnett) are two islets or rocks, moderately high and barren, lying 13 miles S.S.W. from the S.W. point of Parida. They are very steep-to, and 70 fathoms are found close to their southern edge. They are quite safe in all directions, except to the North, where some rocks lie a mile off.

At 4 miles North of the Ladrones is a dangerous reef, which does not even show at low water, when there is $6\frac{1}{2}$ feet water over it. It lies with the West side of Parida bearing N. 9° E., and the East side of the Ladrones bearing South.

Montuosa is a lofty wooded island, completely isolated, 26 miles S.S.E. of the Ladrones and 22 miles West of Coiba. It is safe, except some rocks to the East of it, and is a good mark for approaching the coast.

Colnett says:—"It rises to a considerable height, and is 5 or 6 miles in circumference, its summit covered with trees; the greater part are those which bear the cocoa-nut, which gives it a very pleasant appearance; but

islets and breakers extend off its East and West ends, to the distance of 3 or 4 miles. The bottom is rocky on the South side, as is the shore near the sea. There is a beach of sand behind some little creeks that run in between the rocks, which makes a safe landing for boats. Here we went on shore, and got a quantity of cocoa-nuts, with a few birds. The Spaniards or Indians had lately been there to fish on the reef for pearls, and had left great heaps of oyster-shells. There were a great plenty of parrots, doves, and iguanas; and it is probable that other refreshments might be obtained, of which we are ignorant. At all events, it may be useful to whalers or cruisers, by offering a place where the sick may be landed and cocoa-nuts procured, whose milk will supply the want of water."

POINT BURICA or **Burrica** is the western limit of the state of New Granada. It makes afar off like an island with three summits equally elevated and distant from each other; on nearing the cape another low point is made out which seems at first like an island, but is afterwards seen to form part of the point. To the southward of the point breakers extend for a mile, and terminates in this direction by a large, high and isolated rock, which forms an outer beacon. The cape may be seen in clear weather 35 miles off, and is thus an excellent landfall for ships coming either from eastward or westward.

The territory of *Burica*, according to Mr. J. H. Smith (1854), does not belong to the general government of New Granada, but is exempt from some of the imposts. It extends from the *Guanavaro coast*, on the East side of the Burica peninsula, to the Rio Claro, which falls into the Golfo Dulce. The coast between is an extensive region of cocoa-nut trees, 21 to 25 miles in length. But this thinly populated and uncivilized region has but little claim to exact political or social divisions, and its nomenclature and inland features are alike vaguely known. The exclusive claim of New Granada to the transit route across the isthmus has led to more attention being paid to its boundaries than they otherwise deserve.

2. COSTA RICA.

The state of Costa Rica is one of the smallest in area and population of the Central American Republics. It extends from Point Burica to a point somewhere about Salinas Bay and the Lake of Nicaragua, but in this northern part a territory is claimed which is disputed by Nicaragua. It belonged to the latter state when the confederation was formed in 1826, and was then conceded to Costa Rica to give it weight in the federal congress. But when the confederation was dissolved, it is contended that it should have reverted to the original state. This district of *Guanacaste*, now called *Liberia*, includes several of the proposed termini of the inter-oceanic canals

and railways, and this gives it an importance it does not otherwise possess. In 1856 it was usually considered that Costa Rica terminated on the Pacific coast, on the North side of Salmas Bay.

The soil of Costa Rica is exceedingly productive. On the "tierras calientes," or torrid lands, which run back from the Pacific up to an elevation of 3,000 feet, almost all the tropical productions abound. Above these are the "tierras templadas," which are terraces making out from the main Cordilleras (following very nearly the longitudinal axis of the state in a north-west and south-east direction), and are from 3,000 to 5,000 feet above the level of the sea, producing sugar-cane, potatoes, corn, coffee, oranges, &c., in great perfection.

Still above the terras templadas are the tierras frias, or cool lands, which are from 5,000 to 6,000 feet above the ocean level, among which several volcanoes shoot up, varying from 8,000 to 11,000 feet in height. The forests which extend over a large portion of the republic, abound in timber suitable for ship-building; also mahogany, brazil, and various other valuable dyewoods.

The cultivated portion of Costa Rica lies principally within the valley of the Rio Grande, which flows down the western slope of the main mountain range into the Gulf of Nicoya. Fully seven-eighths of all the inhabitants are here concentrated, in a district not exceeding fifty miles in length by an average of twenty in breadth.

The Coast from Point Burica trends generally to the north-west, and is as before stated low, and covered with cocoa-nut trees. There are no places of interest, and only four Indian villages on the space of 25 miles between that point and Point Platanal, near the entrance of the Golfo Dulce. At 5 or 6 miles from the South point is a projection called Punta Gorda. The intermediate coast has not been surveyed, but is believed to be safe. A running survey of the coast and harbours beyond Point Platanal, as far as Istapa, was made by Capt. T. de Lapelin, in the French corvette *La Brillante*, in 1852, and from his pamphlet the following directions are chiefly taken.

The GULF of DULCE lies 30 miles to the N.W. of Pt. Burica. But very little was known of it till in 1849 a concession was made to a French company, and in 1850 a plan of it was made by M. Louis Cheron, and again in 1852, when its shores and capabilities were examined by the officers under Capt. de Lapelin. From this it would appear to be one of the best points of the old Spanish territory for European colonization, considering its fertility, healthiness, and safety of its navigation. The gulf is recognisable at a great distance. Its outer points are well marked, and are 18 miles apart, East and West.

Point Matapalo, on the West, is the South extremity of the peninsula and of the Cerro de Sal si Puedes. It is high, steep, and covered with trees,

with some reddish coloured land-slips. At a mile E. by S. of it is an isolated rock 10 or 12 feet high, easily seen in all directions.

Pt. Platanal, the eastern point, is the South end of a promontory formed by the chain of mountains which separates the low lands of Burica from the plain of the Rio Coto. This promontory is terminated to the North by a round-topped peak, covered with trees, rather higher (2,329 feet) than those near it. This hill will indicate the *Punta del Banco*. All the shores of the entrance are clear and free from danger; but in coming hither it is well to make Cape Matapalo, as the only habitations are on the West side, at the Punta Arenitas, and on this side also are convenient anchorages in case of being becalmed during the ebb, as throughout the gulf, except in the Rio Coto Bay, the depths are 20 and 30 fathoms at 2 to 4 cables from the shore, and then deepening to 50 and 100 fathoms.

The outer portion of the gulf runs in a N. and S. direction 22 miles, with a breadth of 16 miles; beyond this it runs to N.W. for 25 miles to the foot of the Cordillera, where it is 10 miles wide. From Point Matapalo to the Rio Rincon at its N.W. end, an extensive plain extends to the sloping foot of the Cerro de Sal si Pudes. The shore is all low and wooded. To the North of Pt. Matapalo is *Pt. del Sombrero*, and 3 miles further that of *Tigrilo*. Off these two points are some rocks above water, those off Sombrero extending half a mile, and off Tigrilo three-fourths of a mile. These are the only dangers in approaching Punta Arenitas.

PUNTA ARENITAS* is 9 miles beyond *Pta. del Tigrilo*. It appears to be low and entirely covered with wood. It is not until close to that the houses covered with palmetto trees and the flagstaff on the bare sandy tongue is seen. At a cable's length East of the point is a coral bank, which partially dries at low water. Its greatest breadth East and West is two cables, and it is twice that length North and South. Its edges are very steep-to, and small vessels can pass between it and the point. You may anchor to the N.W. or to the S.E. of the village. The latter is the best for vessels making but a short stay, and they will here get the sea-breezes and avoid the excessive heat occasioned by the shelter of the point. To take this anchorage, bring the flagstaff or the last cluster of houses to bear W. by N., and the Pt. del Tigrilo to South, at less than a mile from the shore in 10 to 11 fathoms, bottom green mud. To reach the anchorage North of the village, having passed the coral bank, bear to the West, steering for an ostero (or creek), distinguishable from some large trees with white trunks, with foliage only on the tops. As soon as the flagstaff or the outer houses bear E. of S.E. drop anchor in about 16½ fathoms, bottom of green mud. This

* Punta Arenitas is called Punta Arenas (Sandy point) on most charts, but the distinction is here made that it may not be confused with the more important Punta Arenas, the chief port of the republic, in the Gulf of Nicoya.

inner anchorage is very good, and any repairs may be done in great security, but if it is necessary to heave down to the keel it is better to go to El Golfito. To communicate with the village, you can land to the North of the peninsula at the entrance of a creek; this point is so steep-to that you can lay alongside as at a quay.

Fresh provisions, in small quantities, may be got at Punta Arenitas. Firewood is also cheap; bullocks are to be got at the hacienda del Tigre. The neighbouring forests are rich in spars and timber, but you must cut it yourself. Water is to be got at the River del Tigre, 5 miles to the northward between half-flood and half-ebb. The French company before alluded to intended to establish themselves on the banks of the River del Tigre. A large house built by them distinguishes the Point del Tigre.

It is high water, full and change, at Punta Arenitas at 3^h 15^m. The greatest rise is 10 feet 3 inches; mean rise 5½ feet. The tides are regular throughout the gulf.

The NORTH-EAST SHORE of the gulf is formed by the base of the cordillera, which extends from the Rio Rincon to the Golfito. Its rugged slopes are covered with an impenetrable forest, and leave but a very narrow beach here and there. At 9 miles N.E. by E. from the River Rincon are the Islotes, a small group composed of rocks and coral banks, on which they fish for pearls and mother-o'-pearl. The cordillera then runs for 21 miles E.S.E., terminating at the Golfito. At 4½ miles from las Islotes is the mouth of the Rio de las Esquinas, which traverses a large and very marshy valley near the sea. At 10 miles E. 18° S. from Pta. de las Esquinas there are some rocks indicating Cape San José; around these rocks they fish for mother-o'-pearl.

The Golfito entrance is 800 yards wide, and the passage in mid-channel between the high and well-marked point to the North, and long narrow sandy tongue to the S.W. has a depth of 5½ to 6½ fathoms. This sandy neck divides the Golfito into two parts, in either of which you may anchor, but if in the eastern part it is not advisable to bring the houses on the point to North of W.N.W. The Golfito is a landlocked basin, where you may heave down and careen, but unfortunately in all seasons it rains nearly every day, and storms are frequent. The watering-place is in the North part of this small gulf, but the casks must be filled at low water, and floated off at high water.

The Rio Coro, the largest stream which enters the Gulf of Dulce, is 7½ miles southward of the Golfito. It is not navigable. From its mouth a bank extends to the northwards, which joins the tongue which divides the Golfito. The coast is low, sandy, with a violent surf, and covered with cocoa-nut trees. To the southward of the river, the coast, though low, is clean as far as the Pta. del Banco, the S.E. point of the Gulf of Dulce.

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land and sea breezes (the virazon and terral), the former blowing from S.E. to S.W. between 11 a.m. and sunset, when it is replaced by the terral blowing from N. to W. Notwithstanding its hot and humid climate, the gulf is considered healthy by the natives, but this can afford but little evidence of its effects upon European colonists.

The Coast beyond Punta Matapalo extends for 20 miles to the W.N.W. to the high and abrupt *Pta. Sal si Puedes*. It is a narrow and sandy beach, forming a large cocoa-nut grove, behind which rises the Cerro. It is very steep-to, for at less than half a mile off shore, in the shoalest part, there is more than 40 fathoms, a strong surf usually beating on this shore.*

At the point *Sal si Puedes* the Cerro approaches the beach, and at less than a mile off the point is a round bare rock, called the *Choncha Pelona*, around which the water is very deep, but you cannot pass inside it.

From *Pta. Sal si Puedes* to *Pta. Llorona* the distance is 14 miles in a N. 47° W. direction. Between these points is the *Corcovado*, a large rock 35 feet high, at the outer end of a reef composed of rocks above water. The irregularity of the depth and the colour of the water, and the breakers off shore between the two points, seem to indicate danger near the land.

Pta. Llorona is high, steep, wooded, and formed of cliffs partially covered with a rich vegetation, and a cascade falls over one of its perpendicular precipices. Several islets lie within a few cables lengths of the point. Cape San Pedro is 3 miles N. by E. from *Pta. Llorona*; near it is a rocky islet with a few shrubs on it, and joined to the land by a chain of rocks, which also project a cable's length seaward from it. This group shelters a part of the sandy beach called the *Port de San Pedro*, distinguished by a rock surmounted by a single tree. On this beach also in a small indentation called the *Puertecito de S. Pedro*, are some ranchos of Indians who come hither to find the purple dye. *Cape San José* is a spur of the chain of hills which overhangs the coast; it may be known by a *rastrado* or a large green patch, bare of trees.

CANO ISLAND is 10 miles to the West of Cape S. Pedro. It is moderately high and is level. At its N.E. point are a few breakers, and off its West point some sunken rocks extend for half a mile. With this exception, it may be approached on all sides, though it is not advisable to do so from the eastward, as the current drifts towards these last-named rocks. On the N.W. side is a spring and some banana trees, on a sandy beach, where the landing is easy, and where the bongos come to collect the caoutchouc, which is abundant on this island.

* The name *Sal si Puedes* (get out if you can), applied to this beach, is said to be derived from the fact that the bongos which come here to load with cocoa-nuts, though able to land easily at times, have great difficulty and detention in embarking through the formidable surf.

The Rio Ajuja debouches in the angle where the high land of Cape San Pedro joins the beach running to the North. It is the best shelter that the bongos find between the Gulf of Dulce and that of Nicoya, and is the only place where watering is easy. To the northward of this the coast is high and wooded; its narrow beach is interrupted by the mouths of the Granado and the Idraque, and beyond these is the Boca Sierpe. To the North of these again is *Pta. Violin*, off which is a small wooded islet of the same name. At a mile North of this are the *Sacate Islets*. The coast here forms the narrowest part of the isthmus, which separates the ocean from the head of the Gulf of Dulce.

From hence the coast runs to the North for 22 miles, and is uniformly low and wooded. Inland is an extensive marshy plain, on which it is said is a large lake, and is watered by the Rio Burruca. Through this level coast are four bocas or mouths to the river and the lake, and it is said by the natives that these communicate with each other, so that a bongo entering at Sierpe can come out at any of them, or at Punta Mala de los Indios. At the North end of the plain the coast is quite clear and the depths diminish gradually.

At *Punta Mala* is a perpendicular cliff, and the high coast here turns to the westward and N.W. This coast is formed by a spur from the cordillera, and extends for 14 miles to *Point Dominical*. At *Point Ubita*, midway, a reef and some rocks shelter an anchorage, which is said to be deep enough for any vessel, and that water may be procured easily at the Rio Ubita here. It is constantly frequented by the Indians.

At $3\frac{1}{2}$ miles from Ubita is a large reddish coloured rock called *La Ballena*, and at a mile East from this are three small and pointed rocks called *La Ballenita*. Point Naranjo is 9 miles from Point Dominical; the coast between is a sandy beach, traversed by some inaccessible rivers and is quite clear.

At 5 miles N.W. from this point is that of *Las Quepos*, covered with trees. Between these points are a number of islets and rocks, forming two distinct groups, which are connected with the shore. The southernmost group are called the *Navajos*, the northern the *Quepos*. The largest of the latter group is called *Manuel Antonio*, and shows a remarkable gap. It shelters a small sandy bay, fit for the bongos which come fishing for turtle.

Point Mala is 22 miles West of the Quepos, the coast between being a sandy beach, beaten by a continual surf, without landing place. Near *Pta. Mala* there is a line of cocoa-nut trees a mile in length. The point is very low, and covered with trees and mangroves. To the South of it extends a reef of rocks and islets a mile and a half in extent. The depth is very irregular on its edges, and the current drifts past it to the westward, frequently at 2 miles, and never less than 1 mile an hour.

Point Guapilon is 6 miles from *Pta. Mala*; the coast between is sandy and

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low, but is lined with breakers to 3 or 4 cables' lengths off abreast the small rivers *Usubre* and *Tusubre*. Off Point Guapilon are two rocks awash, on which the sea breaks; they are half a mile off the point, and have a depth of 9 and 10 fathoms between them and the point. At 4 miles W.N.W. is *Herradura Isle*, which shelters the harbour of that name.

Port Herradura is at the S.E. entrance to the Gulf of Nicoya. It is a horse-shoe bay, as its name indicates, facing the West, and is $1\frac{1}{2}$ mile wide between the West point of Caño Island on its South side, and Herradura Point to the North. Caño Island is covered with trees, and has a reef all around it, which connects it with the shore. The northern point of the bay is also bold and rocky, and a reef skirts it on all sides for some distance, but the edge of this reef is steep-to, as is the case all round the bay, and therefore the shores should be carefully approached.

A *sunken rock*, nearly awash, has been found in the middle of the bay since the survey. It lies with a house on the beach bearing N.E. $\frac{3}{4}$ N. three-quarters of a mile, and the pinnacle of Caño S.W. by S. nine-tenths of a mile. At the head of the bay is a watering-place, where excellent water may be obtained. Sir Edward Belcher says that twenty casks at a time may be obtained by rolling them into a small lake *on the beach*. This lake was made to be in lat. $9^{\circ} 38' 30''$ N., long. $84^{\circ} 36' 7''$ W. The anchorage is off this watering-place in 5 to 8 fathoms, but vessels may ride close to the shore by veering the whole cable with a warp to the beach.

The **GULF of NICOYA** was surveyed by Sir Edw. Belcher in the *Blossom* in Jan., 1839. His fine chart has long been published. It was also examined by Captain de Lapelin in *La Brillante*, and we derive much of what follows from that officer's remarks.

CAPE BLANCO is the south-westernmost point of the bay, and is thus described by Dampier:—"Cape Blanco, is so called from two white rocks lying off it. When we are off at sea right against the cape, they appear as part of the cape; but being near the shore, either to the eastward or westward of the cape, they appear like two ships under sail at first view, but coming nearer, they are like two high towers, they being small, high, steep on all sides; and they are about half a mile from the cape. This cape is about the height of Beachy Head in England, on the coast of Sussex. It is a full point, with steep rocks to the sea. The top of it is flat and even for about a mile; then it gradually falls away on each side with a gentle descent. It appears very pleasant, being covered with great lofty trees.*

* To the westward of Capo Blanco a bank is marked on the charts; Captain de Lapelin doubts its existence, but was unable to verify it. The coast thence trends to N.W. It is steep and densely wooded: the higher hills rarely exceed Cape Blanco in elevation. The beach is of sand, separated by rocks into an infinity of bays, which will offer easy landing-places.

The entrance to the Gulf of Nicoya is distinctly marked by Cape Blanco on the West, and Point Herradura on the East, forming an opening 30 miles wide. Cape Blanco is the point that has been generally made by keeping a little to the East of its meridian; but there is probably some advantage gained by making the eastern side as the currents shift to westward, and the distance would be rather shorter.

Cape Blanco may be seen at 25 miles distance when to the N.N.W., appearing then like an island, the top of which is flat, and having near its centre a slight indentation. Several white patches also serve to distinguish the cape from the land at the back of it. The largest and lowest white spot is formed by an islet quite white, lying South of the cape, from which it is separated by a channel a mile wide; but it does not appear to be detached until you are within 10 or 15 miles. It is only when Cape Blanco is seen from the West, or to the North of West, that its true termination can be seen; being much lower than the surrounding land, it projects like an island and falls abruptly towards the sea. At the same time a small needle-shaped rock will be seen a little to the South of the islet.

The Pta. de la Herradura, which forms the northern side of the harbour of the same name, is a large rounded hill on the high land. A large rocky islet, covered with trees of nearly equal height with the point, lies off the S. point, leaving a narrow impracticable passage.

As far as the anchorage of Punta Arenas, the Gulf of Nicoya has no danger that is not visible. All the points and the shores may be approached to within two miles. The islands are numerous, and some of them large; they are covered with trees, but are uninhabited, and at present possess no interest whatever. The western part of the gulf is nearly a desert, and the ports which as yet have not been frequented, lie on the East side; these are those of Herradura, Calderas, and Punta Arenas. The bay of *Tarcoles* also affords a good anchorage, where communication is easy with the shore.

The harbour of Herradura is a good anchorage, is uninhabited, and without any communication with the interior; it has no other resources than an excellent and abundant watering place.

CALDERA was the port of entry for Costa Rica till 1840, at which time its unhealthiness caused it to be abandoned for Punta de Arenas, notwithstanding its security, and its proximity to the capital. It is about 12 miles N.E. of Cape Blanco.*

* Calderas possesses a peculiar interest at the present moment, as it is said to be the terminus of one of the inter-oceanic communications. According to a report, published in 1866, by Mr. F. Kurtze, C.E., director of the public works of Costa Rica, a waggon road from sea to sea was just completed, starting from Port Limon, near Point Blanco, 60 miles South of Greytown, on the Atlantic side, crossing the summit level near Cartago, 5,118 feet above the sea, passing near San José the capital, terminates at Calderas. It is a macadam-

PUNTA ARENAS.—In 1840, Punta Arenas was declared a free port, and has become the most important commercial place on all the coast of Central America. It is the only port of the state of Costa Rica, which is frequented on the Pacific, and through it almost all its exports and imports pass. The sandy peninsula on which the village stands shelters an interior anchorage, called the *Estero*, into which, at high water, vessels drawing 13 feet can enter; to the South of it is a spacious roadstead, with an average depth of $5\frac{1}{2}$ fathoms, which, although secure in the fine season, requires some precautions against the summer winds.

Punta Arenas has a population of about 1,500. Its streets are straight and regular, but disagreeable from the sandy soil. They extend along the *Estero*, by which all communications with the outer road take place.

In entering the Gulf of Nicoya the only precaution necessary is to hug the eastern shore, for the ebb tide, which runs to S.W. to the South of the Negritos, is less felt, and the depth, though great, is less than on the western side; so that in case of a calm, or contrary current, an anchorage is more readily found; or you may be drifted out of the gulf, or else on to the Negritos, near to which the depths are great. You may readily know them by a large black rock in front of them, having the appearance of a sail. Soon after passing the line East and West of the Negritos, you will see between these islands and that of San Lucas, two remarkable islets.

The first of these is called *Cagaves* (the *Aves* of Sir Edward Belcher), is like a circus open to the East formed by perpendicular rocks, crowned with trees, and surrounded by a beach of pebbles covered at high water. The second is a conical, lofty, and wooded rock, sufficiently designated by its name *Pan de Azucar* (Sugar-loaf). Having made these islets, you will next discover the lighthouse rising from the trees. It is on a yellow tower of several stages, elevated 66 feet above the sea, and showing a fixed light, visible 10 miles off. At the same time you will see, but much more to the left, a large building, which serves as a custom-house. This is the most westerly building, and nearest to the *Puntilla de Punta Arenas*. It is painted white, and covered with tiles, and near a cluster of cocoa-nut trees, the only ones on the peninsula.

The custom-house or the lighthouse being well made out before being East and West with the *Pan de Azucar*, steer so as to bring the first not more North than N.N.W., or the second to the North of North by West, so

ised road, 60 feet wide, with cut-stone bridges, and with ample width for constructing a railroad over much of its course.

Two canals have also been proposed to terminate in the Gulf of Nicoya, one from the river San Juan, by the Rio San Carlos, terminating near Punta Arenas; and a second from the Lake Nicaragua by the Rio Nino, and the Rio Tempisque, which falls into the head of the Gulf of Nicoya. Neither of these canal projects have been surveyed.

as to avoid the banks of Punta Arenas, which limit the road to the North and West.* It will be necessary to keep close to the bearings here laid down, for to the North of the Negritos the flood tide runs very strongly to the W.N.W., and the ebb to E.S.E. These banks, formed by the rivers Aranjuez and Baranca, are separated from Punta Arenas by the channel of the Estero, the depth and direction of which change with every tide. Having approached the anchorage on the foregoing bearings, you must anchor when the Pan de Azucar bears S.W. $\frac{1}{2}$ W., or the Cagaves S.W. This position is a mile from the Puntilla de Punta Arenas, in a depth of $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, fine sandy mud, and easy of communication with the village at all times of tide. A little farther to the East the bottom is better for holding, being more mud than sand; the lighthouse will then bear N. 28° W., the custom-house N. 39° W., the Pan de Azucar S. 52° W., and the Cagaves S. 43° W. These anchorages may be taken during the fine season, or from November to June; but during the summer they are too near the banks, as the bottom is continually shifting from the strong currents, and you may be drifted on to the banks. The better position at this time will be with the custom-house to N.W. $\frac{1}{2}$ N., the lighthouse N.N.W., and the Pan de Azucar W.S.W. in $5\frac{1}{2}$ fathoms, muddy sand. It will be as well to moor S.E. and N.W., to avoid the chances of fouling your anchor by the continual swinging of the ship.

The anchorage of the Estero cannot be taken without a pilot. The charges for this are 6 reals for each Spanish foot (10 9-10 English inches) draught.

The tides are regular at Punta Arenas; their maximum velocity is $1\frac{1}{2}$ knots, and the average 1 knot. The establishment of the port at Punta Arenas is $3^h 10^m$, and the range at springs 10 ft. 2 in.

Water is to be procured at the Rio Baranca, 7 miles to the East of the anchorage. The bar can only be passed between half flood and half ebb. The river must be ascended for a mile, until the boat grounds, before which the water is not fresh, and even then is sometimes not very good. On account of the tides, not more than two trips can be made in the day. Fresh provisions are abundant, but live bullocks cannot be easily procured. Sea stock may frequently be procured, but not in large quantities. Realejo offers greater advantages on this score. The healthiness of Punta Arenas is but comparative; fever is prevalent throughout the year, attacking natives and strangers alike, but milder during the fine season than in the opposite one.

* If the lighthouse nor the town be not made out before having passed the parallel of the Pan de Azucar, and thus bearing to N. of N.N.W. or N. by W., it will be necessary to fall back again to the southward before bringing these marks on, for without doing this there will be a risk of getting on to the banks which project to the S.E.

There is no coasting trade in Costa Rica, as there is only one port open on the Pacific. The carrying trade along the coast of Central America is entirely monopolized by the steamers of the Panama Railroad Company, and although the expense of forwarding merchandise by Panama is three times as much as by Cape Horn, still the certainty and speed of the one will ultimately quite supersede the other.

Punta Arenas was a free port till January, 1861; since then customs duties have been collected, but the shipping dues have not been altered. These are 5 dollars (£1) for license, 1 dollar per man for hospital dues, $\frac{1}{2}$ real (3d.) per ton lighthouse dues.

Owing to the partial filling up of the harbour, vessels are obliged to lie much farther off than formerly, and there is some trouble in landing, &c., at low water. With steamers, which arrive at all hours of the day and night, much damage is done to the goods in the launches by rain and spray. The lighthouse is not in good order, and much reliance should not be placed on it. On account of the deterioration of Punta Arenas, it was proposed to remove the port to *Turcoles*, a spot to the eastward, and nearer to the capital; but it was negatived by the congress in 1864. The restrictive policy of the Government has much reduced the prosperity of the port, which is now little more than a depot.

The **COAST** to the north-westward of Cape Blanco is almost unknown. A very imperfect survey of it was made by Mr. Hull, R.N., in 1859, and Capt. de Lapelin also made a slight sketch of it, but the two do not agree. The coast is high and wooded, and has a beach of white sand interrupted at intervals by reddish coloured cliffs. *Cape Guiones* of De Lapelin is marked on his chart at 18 miles from Cape Blanco, and 30 miles farther is *Morro Hermoso*, but Mr. Hull did not observe anything prominent in these positions. Beyond them is Cape Velas, in lat. $10^{\circ} 13' N.$, long. $85^{\circ} 48' W.$ * It is so called from the rock being sometimes mistaken for a sail.†

* We lay along a deep bay, and passed some very remarkable rocks or rocky islands, white with green tops, the Port of Matapala bearing S.S.E. Between that and these rocky islands a number of small, high, white rocks shot up, resembling vessels under sail: bearing E., E. by N., and E.N.E., a little bay extending landwards, and called, as I suppose, from these little rocks, "Puerto Velas."—*G. U. Skinner, Esq.*

† Captain de Lapelin says that he found neither point nor hillock noticeable in the position assigned to Cape Velas and the Morro Hermoso, and in his passage from the North it was not until he reached lat. $9^{\circ} 53' N.$, long. $85^{\circ} 52' W.$, that is 21 miles farther South, and 12 miles West of that assigned to Cape Velas, that they saw a greyish cliff, slightly projecting from the line of coast, perpendicular, and surmounted by some trees. The sea broke on a reef at its foot, which extended a mile and a half. It also broke on the numerous detached rocks to the South of a white sand islet, on which two rocks stood, appearing like

The BIGHT of PAPAGAYO may be said to commence here, extending to the northward to Realejo, being but a slight curve in the general line of coast. It is scarcely worthy of the name, but becomes more familiar from the fact of the peculiar winds experienced off it called by the name, which are elsewhere described. Suffice it here to state, that the *papagayo* is a strong wind, blowing from N.E. to E. by N., with a bright, clear sky overhead, and a glaring sun, with a dense atmosphere.

At Cape Velas, Captain Sir Edward Belcher lost the *papagayo*; "therefore," he says, "the limits may be included in a line drawn from Cape Desolado to Point Velas, and it is rather a curious phenomenon that the strength of this breeze seldom ranges so far as this chord, but seems to prefer a curve at a distance of 15 or 20 miles from the land."

In passing the Bight of Papagayo it is considered best to keep at 5 or 6 miles off shore rather than farther off; the squalls and calms are of shorter duration, and less force at this distance than in the offing. Should this course be impracticable, a distance of 10 or 15 leagues should be taken. In proceeding to the North the wind will be found to veer more to the East.

Gorda Point,* according to the chart, lies 18 miles northward of Cape Velas, in lat. $10^{\circ} 31' N.$, long. $85^{\circ} 43' W.$ At this point the coast turns abruptly to the E.N.E., towards Port Culebra.

Off Point Gorda are several high rocks, the two largest, which are close together, are about $2\frac{1}{2}$ or 3 miles from the land, the others lay principally more to the North and N.E.; they were all high, and the smaller ones have very much the appearance of upright tombstones; others again, at first sight, appear like a ship under canvas.

PORT CULEBRA was surveyed by Captain Sir Edward Belcher in 1838. spot at which he observed, at the head of the port, he places in lat. $10^{\circ} 36' 55'' N.$, long. $85^{\circ} 33' 30'' W.$; variation $7^{\circ} 5' 54'' E.$ The entrance to the port is between the *North* and *South Viradores*, some detached cliffy islands, $1\frac{1}{4}$ miles apart. Between the *South Viradores* and *Cacique Point*, to the N.W. of which they lie, there is a channel of 5 to 10 fathoms; but, as a rocky reef runs off a quarter of a mile to the West of the point, and some detached rocks lie South of the *Viradores*, it should not be used.

Cocos Bay lies to the southward of the *South Viradores*, and between *Cacique Point* and *Miga Point*, bearing S.W. by S. from the former: the distance is about $1\frac{1}{4}$ mile. These points are both rocky cliffs, surmounted by hills. Cocos Bay may be about a mile in depth within the line of opening.

sails. This cliff, called *Capo Guiones* (for the local pilots knew no point under the name of *Las Velas*), is 30 miles W.N.W. of Cape Blanco, and 20 miles West of the coast laid down on the charts.

* Point Catalina (of Bauza): from the disjointed portions or islands, it might have caused that of *Murcielagos* to be mistaken for it.—Voyage of the *Sulphur*, vol. i, p. 185.

The bottom is formed by a sandy beach, off the South part of which a line of rocks runs North about a quarter of a mile, and another small rock lies in its eastern part. It lies entirely open to the N.W. *Sesga Point* lies a mile and a half S.W. from Miga Point, the West extreme of the bay, and midway between is a cliffy islet. To the eastward of Cacique Point is a similar bay to Cocos Bay, having about the same width to *Buena Point*, which forms the South Point of Port Culebra, which extends nearly 4 miles within the two entrance points, Buena and Mala, a mile asunder; and is about two miles wide, the depth even, 6 to 18 fathoms, and anchorage everywhere.

Port Culebra is certainly magnificent; and from information by the natives, it is connected with Salinas, and thence to Nicaragua, Granada, &c. If any railroad is contemplated in this quarter, it ought to enter at the Bay of Salinas, which would render these two ports important.

Water fit for consumption was not found at the beach, but may be obtained a short distance up the creek, which a boat may enter at high water. If wells were dug, doubtless it would be found at the N.W. side, as the surrounding country is mountainous. Another symptom in favour of this is the thickly-wooded sides and summits, as well as bright green spots of vegetation throughout the bay.

Brazil wood is very abundant; mahogany and cedar were observed near the beach, but as they have been employed cutting the Brazil, probably all the cedar and mahogany, easily attainable, has been taken. Timber, in great variety, abounded. In the bay, where H.M.S. *Starling* was at anchor there was a large village, where the natives were anxious to dispose of their productions, consisting of fruit, stock, cattle, &c.

The **Murcielagos** lie to the southward of Cape St. Elena; their number is considerable. Two rocks lie to the West of the group more than a mile off, according to Captain de Lapelin, but they are not shown on the English nor the later French charts.

Sir Edward Belcher says the Murcielagos or Bat Islands are eight in number, and almost form two distinct harbours, the smaller islands making a crescent by the South, one large island protecting the East, and another of similar size forming the line of separation. He anchored in the inner or eastern harbour, and completed his water at a very convenient position, in 32 fathoms, with a hawser fast to the shore.

The springs are numerous, and there are tolerable rivulets; but only that they watered at (between the centre point and the main) is safe to approach, by reason of the constant surf. The gulf squalls, even in this sheltered position, come down the gullies with great force, and impeded the work as well as endangered the boats. The geological character of the cape and islands is a schistose serpentine, containing balls of noble serpentine.

CAPE ELENA (or Sta. Elena) is 23 miles North of *Gorda Point*, and is

the western extremity of the peninsula which separates the Murcielagos from Elena Bay. Lieutenant Boucarut, who examined this coast in the French corvette *La Constantine*, in 1859, applies this name to the western point, and calls another projection $4\frac{1}{2}$ miles to the N.E. *Point Elena*. They are each bold, but at one or two cables' lengths from the first point is a *sunken rock*, and at a mile West of the second point is another, which require all caution in approaching Elena Bay.

The peninsula, of which these points are the West and north-west extremes, is like a long prism, the sharpest angle uppermost. The ridge is much serrated, and on its North side is even and very steep. It is quite barren.

ST. ELENA BAY (or *Elena Bay*) is 9 miles to the eastward of the inner point, and is about 5 miles wide in the opening. Its northern point is *Point Descartes*, at a mile due West of which a sunken rock is marked on the French chart; and a second rock, at a quarter of a mile in the same direction. In the S.E. angle of the bay is a smaller inlet, *Tomas Bay*, open to the N.W., three-quarters of a mile wide at the entrance, in which the depth is from 8 to 12 fathoms, and probably affords anchorage and shelter from the S.W., particularly in a channel to the West of a peninsula which separates its head into two inner bays. There are several islets in the Elena Bay, of which *Vagares*, lying off the entrance of Tomas Bay, is the southernmost. At $1\frac{1}{2}$ mile North of this is a higher island, Juanilla; and at a mile S.S.E. from Point Descartes is another, *Despenas*.

SALINAS BAY was more exactly surveyed by Lieutenant Boucarut, in the French vessel *Constantine*, in 1859.* Between *Point Sacate*, which is 2 miles N.N.E. of Point Descartes and *Point Arauca Barba* on the North side, the entrance is 2 miles wide, and the depths 18 to 20 fathoms. From this line to a narrow sandy beach at its head the depth of the bay is 4 miles, and the depth gradually shoals to 7 and 4 fathoms. *Salinas Island* is placed by Sir Edward Belcher in lat. $11^{\circ} 2' 50''$ N., long. $85^{\circ} 40' 45''$ W. It lies on the South side of the bay, and is almost connected with the South shore by a shoal which has from 3 feet to 16 feet water on it, but 7 fathoms between the shoal and the S.W. coast. On the North side of the bay a reef of rocks lies against the shore, called *El Osteonal*. To enter Salinas Bay, a good mark, according to Captain de Lapelin, is to bring the sharp volcanic Peak of Orosi, cleft on the summit and 5,200 feet high, to bear S. 83° E., which will lead up to the island, under the shelter of which there is good anchorage in the season of the West and S.W. winds.

* Salinas Bay is one of the Pacific ports proposed for an inter-oceanic canal. The line is from the Nicaragua Lake by the Sapoa Valley to the southern part of the bay on the Pacific Coast.

Salinas Bay offers many facilities for commercial purposes, and being separated by only a narrow isthmus 20 miles wide from Lake Nicaragua, it has attracted attention as an advantageous terminus for an inter-oceanic canal. It is in the disputed department of Guanacaste.

Cape Nathan is $4\frac{1}{2}$ miles W.N.W. from the North point of Salinas Bay, the coast between being much broken up into small bays, with bluff projecting points between them. Some islets lie to the West and N.W. of the cape at a quarter of a mile distant, but the water is deep close outside them. The same irregular and bold coast continues for 7 miles farther to N.W. to the southern entrance point of San Juan del Sur.

3. NICARAGUA.

The Republic of Nicaragua is commercially one of the most unimportant States in the world. Its 300,000 inhabitants, of whom not one-tenth are whites, produce or require but little for the rest of the world. Were it not for its magnificent line of lakes, by which an accessory Transit Route was once established under the auspices of Mr. Vanderbilt, it would not be worth notice. Since the state has thrown off the yoke of Spain, it has gradually sunk in power and wealth, and the few respectable inhabitants have small weight in state affairs. The northern part of the republic is mountainous, but the southern part is a vast plain, in which lie the famous lakes, being about 200 miles long and 100 miles broad, consisting for the most part of fine savannahs. The great Sierra Madre range, bristling with high volcanic peaks, passes through the western part, broken by the above valley, and the lakes leave but a narrow neck of land between them and the Pacific coasts. This physical condition of this part of the American isthmus has attracted much attention for the great question of the communication between the two oceans. Leon, a fine old Spanish city, about a day's journey from Realejo, the Pacific seaport, is usually (but not always) the capital of the republic. A good account of the State is given in Captain Bedford Pim's work, "The Gate of the Pacific," 1863.*

* The positions of the various points between the Gulf of Nicoya and that of Fonseca, were well determined by Sir Edward Belcher, whose results have been confirmed by other officers. The longitudes of Captain de Lapelin differ from them by from 6' to 8' farther to westward; but as the chronometers of *La Brillante* were not verified for six months from the meridian of Callao (not from Panama), they cannot be preferred to the longitudes obtained in the *Sulphur*. In the table of positions, at the commencement of this volume, the best determinations are preferred.

PORT SAN JUAN DEL SUR.—This portion of the coast is interesting, on account of its proximity to the navigable Lake of Nicaragua; but it is for this reason only, as with the exception of the Port of San Juan, called del Sur, to distinguish it from the other San Juan in this state, at the mouth of the River San Juan de Nicaragua, in the Caribbean Sea, it scarcely possesses any harbour or foreign trade, except in dye-wood.

The South bluff of Port San Juan is in lat. $11^{\circ} 15' 12''$, long. $85^{\circ} 53'$. The proposed communication with the Atlantic, by Mr. Baily,* was to terminate here—a canal, $15\frac{1}{2}$ miles in length, cut across the narrow tract, separating this port from the Lake of Nicaragua, which, with the Rio San Juan, would form the navigable connexion.

Mr. Stephens says: "Our encampment was about the centre of the harbour, which was the finest I saw in the Pacific. It is not large, but beautifully protected, being almost in the form of the letter U. The arms are high and parallel, running nearly North and South, and terminating in high perpendicular bluffs. As I afterwards learned from Mr. Baily, the water is deep, and under either bluff, according to the wind, vessels of the largest class can ride with perfect safety. Supposing this to be correct, there is but one objection to this harbour, which I derive from Capt. D'Yriaste, with whom I made the voyage from Zonzonate to Caldera. He told me that during the summer months, from November to May, the strong North winds which sweep over the Lake of Nicaragua, pass with such violence through the Gulf of Papagayo, that during the prevalence of these winds it is almost impossible for a vessel to enter the Port of San Juan.

"The harbour was perfectly desolate, for years not a vessel had entered it; primeval trees grew around it, for miles there was not a habitation; I have walked the shore alone. Since Mr. Baily left not a person had visited it; and probably the only thing that keeps it alive, even in memory, is the theorising of scientific men, or the occasional visit of some Nicaragua fisherman, who, too lazy to work, seeks his food in the sea. It seemed preposterous to consider it the focus of a great commercial enterprise; to imagine that a city was to rise up out of the forest, the desolate harbour to be filled with ships, and become a great portal for the thoroughfare of nations. But the scene was magnificent. The sun was setting, and the high western headland threw a deep shade over the water. It was, perhaps, the last time in my life that I should see the Pacific, and in spite of fever and ague tendencies, I bathed once more in the great ocean.

* Mr. Baily, a British officer, was employed by the government of Central America to make a survey of this canal route, and had completed all except the survey of an unimportant part of the Rio San Juan (the outlet of the lake into the Caribbean Sea) when the revolution broke out. This not only put a stop to the survey, but annihilated the prospect of remuneration for Mr. Baily's arduous services.

"At 7 o'clock we started, recrossed the stream, at which we had procured water, and returned to the first station of Mr. Baily. It was on the river San Juan, $1\frac{1}{2}$ mile from the sea. The river here had sufficient depth of water for large vessels, and from this point Mr. Baily commenced his survey to the Lake of Nicaragua."—Incidents of Travel, &c.

When Central American transit route was established to assist the traffic to California, this lonely harbour assumed a different aspect. It was made the Pacific steam packet port communicating with the line established from New York by the way of the Lake of Nicaragua and the isthmus. The government of the state decreed the erection of a city (*Concordia* or *Pineda*) on the shore of the bay which forms the harbour. In 1852 this city consisted of a large encampment and a few wooden houses, pompously styled hotels, but on the abandonment of the transit route it sank to its original solitude.

The shore in this neighbourhood is cut up into an infinity of bays or creeks. It is very steep-to, as you nearly touch the shore when in 14 or 16 fathoms. From the great similarity of these bays there is some difficulty in making out the Port of San Juan del Sur, which is most readily done by the bearings of the volcanos of Momobacho, Omotepec, Madeira or Orosi, which rise above the land like so many beacons.

Momobacho is like that of San Salvador in all particulars. Its height, 4265 feet, will not allow it to be seen in every direction, except you are some miles off shore. But the pointed summit of the cone of Omotepec (in the Lake of Nicaragua), 5000 feet high, and the well-marked saddle of the volcano of Madeira, can always be seen, in clear weather, overtopping the hills nearer the sea. In favourable circumstances the volcano of Orosi, 8,665 feet high, with its two pointed summits, exactly resembling two turrets united by an immense ridge can be seen.

The prevailing winds, strong from the N.E., shift suddenly to E. or N.N.W. They rarely allow a ship to reach the port without beating up to it. To gain all possible advantage, keep to the land, where the sea is quiet.

The bearings of the volcanoes will point out, at a distance, the position of San Juan del Sur, and when near it Omotepec will bear N.E. $\frac{1}{2}$ N., or Madeira N.E. $\frac{1}{2}$ E., or Momobacho N. $\frac{1}{2}$ E. These bearings pass over the summit of a hill of a curved figure, and indented like the teeth of a wheel. When within about 12 miles of the land, the points of the bay may be distinguished.

The hill on the North side of the harbour appears like a large greyish patch on the lands behind it. That on the South is like a round clump of reddish colour, and on the continuation of the coast are three white marks, some distance apart; these are three islets frequented by ocean birds. Soon after the entrance is made out the ships at the anchorage will be seen, and then some houses on the beach.

Vessels generally anchor outside the harbour in from 9 to 11 fathoms, keeping over to the South point, as a rocky patch narrows the entrance on the North side. The bottom is of sand and broken shells, and is not very good holding ground against the gusts from the N.E., and its great declivity increases the risk of driving, but at the same time this renders it more safe during the gales from W. and S.W.

The harbour is shut in by a small bay open to seaward, and as the bottom is the same as outside, but of indifferent quality, it is scarcely worth while entering, as communication is easy behind the heads of the harbour. Water is procured from wells, but it is bad, scarce, and difficult to get. Except a few fresh provisions at high prices, there is nothing to be procured here.—*De Lapelin.*

Port Nacascolo, or *Naguiscolo*, or *Playa Hermosa*, lies almost adjoining to, and to the N.W. of, Port San Juan, which it somewhat resembles, and, like it, is only the resort of a few natives occasionally. There is no village or town near it, and it never has been resorted to for general European commerce. In its S.E. portion is a sort of canal, excavated for a short distance to facilitate and shorten the transit of the local trade to the town and lake of Nicaragua, to which there is a road or pathway through the forest.

What is called from custom the Port of Nacascolo, is a little mud creek in a small stream thickly bordered with mangroves; there is no village. Old Chinendega is about 4 leagues from the "port," the road to it a narrow track through the forest, and is a neat little town for Central America. Chinendega is rather a pretty town, with from 8,000 to 10,000 inhabitants, finely situated in a rich undulating plain. It is one of the few towns in Central America which had increased since the independence, and is only 3 leagues from the Port of Realejo, all the trade of which passes through it.—*R. G. Dunlop, 1844.*

Northward of San Juan del Sur the coast trends nearly straight in a due N.W. direction. As was stated in a former page, the district on the coast produces dye-wood, or brazil-wood, for which its ports are much frequented. From information received by Captain Eden, H.M.S. *Conway*, in 1835, the coast between Brito and San Andres was then much resorted to by vessels to load that article. The landing at some of the places is rather difficult; but the anchorage is perfectly safe, particularly from November till May. The winds are then constantly from the N.E., though they sometimes blow very strong; but the sea-breezes during those months never reach the coast.

Brilo is the first point of interest North of San Juan. It is $7\frac{1}{2}$ miles North of Nacascolo, and is a small bay open to the S.W. It is the terminus of a canal proposed by Colonel Orville W. Childs and Mr. Fay, civil engineers, in 1850-1. The narrow neck of land was well surveyed, and the canal was to leave the lake of Nicaragua by the River Lajas, opposite the island and volcano of Omotepec, and would require twelve locks to cross the separation

into the Pacific. But the costly works required in the Atlantic at San Juan de Nicaragua and at Brito, besides all the intermediate engineering difficulties, place the scheme beyond controversy. Brito was pronounced by competent authority to be in size and shape unworthy of this great ship navigation.

The coast to the northward of Brito was surveyed by Malaspina, but we have no particulars of it beyond those given on Banza's chart. But as there really is no point of maritime interest on it, this is of the less importance. Mr. G. U. Skinner says that after Brito follows *Mogote*, an open anchorage; next *Casares*, off the mouth of a river between some reefs. This, by the road, is 7 leagues from the town of Ximotepe, and which is 12 leagues from Managua on the lake. Three leagues further along the coast is the road of *Masapa*, and $5\frac{1}{2}$ leagues further is the anchorage of *Masachapa*, to the southward of *Point San Andres*. Here the Brazil-wood district terminates.

Sir Edward Belcher, in passing along to the North, began to experience gusts from the Lake of Managua (no high land intervening in its course), causing him to go under treble-reefed topsails, &c.

The coast trends, generally, to N.W. by W., and the position of these places is not marked on the charts. They are generally sandy beaches, separated by cliffs, against which the sea breaks with great violence. In about lat. $11^{\circ} 55'$ the volcano of *Momobacho*, 4,265 feet high, will be seen inland when at some distance off shore, as it is not high enough to be seen over the land when close in. It much resembles the volcano of San Salvador in appearance, and seems to be of the same outline in all directions. The land within is very even on the summit, though not very lofty.

Cape Desolada, an appropriate name, lies in about lat. $11^{\circ} 58'$, and it seems almost in mockery that one or two stunted shrubs are allowed to stand on its summit. Mahogany and cedar grow in the vicinity of the cape, and to the North of it is Tamarinda.

Tamarinda is only an open beach, where the coast becomes somewhat lower; beyond it, it rises again, and is called the *Costa Tasca*, forming a long sterile ridge. Off the coast the depths appear to be regular, 16 to 17 fathoms, falling rapidly to 25 fathoms a short distance off.

Behind the coast just described are the great lakes so often mentioned, and of such great interest in the project of connecting the two oceans, a question now (1869) probably about to be solved by the intended canal by the gulf and isthmus of Darien.

The LAKE of NICARAGUA (or Granada) is a fine sheet of water, and, according to Mr. Baily's account of it, is 90 miles long, its greatest breadth is 40, and the mean 20 miles. The depth of water is variable, being in some places close to the shore, and in others half a mile from it, 2 fathoms, increasing gradually to 8, 10, 12, and 15 fathoms, the bottom usually mud,

with a depth of 45 fathoms in the centre. The level of the lake is 128 feet 3 inches above that of the Pacific Ocean at low water, spring tides.

This basin is the receptacle of the waters from a tract of country 6 to 10 leagues in breadth on each side of it, thrown in by numerous streams and rivers, none of them navigable except the River Frio, having its source far away in the mountains of Costa Rica, which discharges into the lake a large quantity of water near the spot where the River San Juan flows out of it. The embouchure is 200 yards wide, and nearly 2 fathoms deep. There are several islands and groups of islets in different parts of the lake, but none of them embarrass the navigation, nor is this anywhere incommoded by shoals or banks, other than the shallow water in shore; and even this is but very trifling, or rather it is no impediment at all to the craft at present in use, the practice being to keep the shore close aboard, for the purpose of choosing convenient stopping places at the close of day, as they scarcely ever continue their voyage during the night.

The largest islands on the lake are Omotepe, Madera, and Zapatera. Taken together, the first two of these islands are 12 miles long, and have gigantic volcanoes on them. Zapatera is almost triangular, and 5 miles long. Sonate, Solentiname, and Zapote, are smaller, and uninhabited, but some of them, and the last in particular, are capable of cultivation.

Near the town of Granada there is the best anchorage for ships of the largest dimensions.

The Lake of Nicaragua is connected with that of Leon by means of the River Panaloya (or Tipitapa), navigable for the bongos employed in that country for 12 miles, as far as the place called Pasquiel, where the inhabitants go to cut and bring away Brazilian timber. The 4 miles which remain between that place and the Lake of Leon are not navigable by any kind of boat, whatever may be its construction, because, beyond Pasquiel, the channel is obstructed by a vein of rocks, which, when the river is swollen, are covered with water; but in the dry season, the water sinks so low that it can only escape through gradually diminishing fissures in the rocks. At a distance of a mile beyond this first vein of rocks, we find another more solid, which, crossing the river at right angles, forms a cascade of 13 feet descent.

The River Tipitapa, which discharges itself into the Lake of Nicaragua, is the only outlet for the Lake Leon. The lands bordering this river are somewhat low, but fertile, having excellent pasturage; as at Chontales, they are divided into grazing and breeding farms. All this country, covered with Brazilian timber, is scantily inhabited. The only village is that of Tipitapa, situated near the above-mentioned waterfall.

The LAKE of LEON or MANAGUA is from 32 to 35 miles long, and 16 miles at its greatest width. It receives from the circumjacent lands, chiefly from

lake is 128 feet above the level of the sea. According to Mr. Lawrence, of H.M.S. *Thunderer*, it is not so deep as that of Nicaragua.

The Lake of Managua is 28 feet 3 inches above that of Nicaragua; and, according to M. Garella, the difference between *high* water in the Pacific and *low* water in the Atlantic is 19½ feet. In the proposition for making use of these lakes, it is stated that the ground is perfectly level between the head and Realejo, one of the best ports on the coast; but the distance is 60 miles, and to Mr. Stephens the difficulties seemed to be insuperable. Sir Edward Belcher is of opinion that there is no insurmountable obstacle to connecting the Lake of Managua with the navigable stream, the Estero Real, falling into the Gulf of Fonseca.

The principal noticeable points on the shores of the Lake of Nicaragua are the city of Nicaragua and the Omotepeque Volcano, 5,040 feet above the sea. Mr. Stephens says it reminded him of Mount Etna, rising, like the pride of Sicily, from the water's edge, a smooth unbroken cone to the above height.

LEON is the capital of the state of Nicaragua; it was formerly a place of importance, with a population of 32,000 souls, but has been since greatly reduced by anarchy and other distracting circumstances. It is situated on a plain about 40 miles from Realejo, 10 from the sea, and 15 from the Lake of Managua. It carries on some trade through Realejo. The houses are described by Mr. Roberts as very similar to those of Guatemala, none being above two stories high.*

The *Plain of Leon* is bounded on the Pacific side by a low ridge, and on the right by high mountains, part of the chain of the Cordilleras.

REALEJO is the next place in proceeding north-westward, and is one of the most important ports on the coast, and has in consequence been more frequently visited and described. It was, moreover, minutely surveyed by Sir Edward Belcher, in the *Sulphur*, in 1838, and was visited by Captain de Lapelin, in *La Brillante*, in 1852.

Behind Realejo, in the midst of the plain of Leon is the volcanic chain of *Marabios*, which commences at Momotombo, near Lake Managua, and terminates in the North at Coseguina. These two volcanic cones serve as the

* The city of Leon is lauded by Father Gage as the pleasantest place in all America, and calls it the "Paradise of the Indies." Dampier was here in 1685, and his men marched up to it to take it, and they set it on fire, but did not procure much plunder. The way to it, he says, is plain and even, through a champion (champagne) country, of long grassy savannahs, and spots of high woods. About 5 miles from the landing-place there is a sugar work, 3 miles further there is another, and 2 miles beyond that there is a fine river to ford, which is not very deep, besides which there is no water all the way till you come to an Indian town, which is 2 miles before you come to the city, and from thence it is a pleasant straight sandy way to Leon.—*Dampier*, vol. i. p. 218.

extreme landmarks for a line of volcanic peaks which are so numerous as to be embarrassing. No less than eight are visible at the same moment from the offing of Realejo. But about El Viejo and Momotombo there can be no doubt. The latter is known by the whitish smoke enveloping its summit, and is a steep cone of regular figure, so regular as to resemble one of the pyramids. Besides this there is the peak of *Momotombita*, similar in form to Momotombo, but much lower. This is on Lake Managua, and cannot be seen from Cardon. In going from S. to N. are the volcanoes of *Axusco*, *Las Pilas*, *Telica*, and *Santa Clara*. Telica is the most remarkable of these after El Viejo or Momotombo. It is in lat. $12^{\circ} 34' 46''$ N. It is a regular and very steep cone of 2,950 feet.

The port is formed by the three islands of *Castanon*, separating the Estero Dona Paula* from the Pacific on the South, *Cardon Island* in front of it, and forming two entrances, and the larger island of *Aseradores* (Sawyers) to the northward.

Sir Edward Belcher thus concisely describes the harbour:—"Cardon, at the mouth of the Port of Realejo, is situated in lat. $12^{\circ} 27' 55''$ N., and long. $87^{\circ} 9' 30''$ W. It has two entrances, both of which are safe, under proper precaution, in all weather. The depth varies from 2 to 7 fathoms, and safe anchorage extends for several miles; the rise and fall of tide 11 feet; full and change $3^h 6^m$. Docks or slips, therefore, may easily be constructed, and timber is easily to be procured of any dimensions; wood, water, and immediate necessities and luxuries, are plentiful and cheap. The village of Realejo (the name signifies a barrel or chamber organ) is about 9 miles from the sea, and its population is about 1,000 or 1,200 souls. The principal occupation of the working men is on the water, loading and unloading vessels. It has a custom-house and officers under a collector, comptroller, and captain of the port."

Captain de Lapelin says that it is the only place hereabout where coal can always be procured, but it is also very dear. Wood may be cut on Aseradores Island, but care is required against snakes. There are also numerous sharks in the Estero. The anchorage here is very unhealthy and hot in the rainy season.

The Island of Cardon is of volcanic origin, and the beach contains so much iron that the sand, which probably is washed up, caused the magnetic needle

* Sir E. Belcher states, in his appendix, that the Estero (or creek) of Dona Paula takes a course toward the city of Leon, and is navigable to within 3 leagues of that city. It has been suggested to carry a railroad from Leon to the Lake of Nicaragua. As to any canal into the Pacific, unless behind the Momotombo, Telica, and Viejo Range into the Estero Real, Sir Edward Belcher saw little feasibility in the scheme.

to vibrate 21° from zero. On the West end they found a mark, probably left by the *Concey* a few years back.*

The present village of Realejo (for the name of town cannot be applied to such a collection of hovels) contains one main street about 200 yards in length, with three or four openings leading to the isolated cottages in the back lanes of huts.†

The inhabitants generally present a most unhealthy appearance, and there is scarcely a cottage without some diseased or sickly-hued person to be seen.‡ About a mile below the town the ruins of an old but well-built fort are yet to be traced. Vessels of 100 tons have grounded at the pier of Realejo custom-house, but above that they would be left dry at low water.

Realejo is the only port after quitting Panamá where British residents can be found, or supplies conveniently obtained. Water of the finest quality is to be had from a powerful stream, into which the boat can be brought, and the casks filled, by baling, alongside of a small wall raised to cause a higher level. Here the women resort to wash, but, by a due notice to the alcalde, this is prevented. A guide is necessary on the first visit, after entering the creek which leads to it, and which should only be entered at half-flood. It is necessary to pole the remainder, the channel not having sufficient width for oars.

The water from the well on the Island of Aseradores is good; § but Sir E. Belcher says, "I have a great objection to water infiltrated through marine sand and decayed vegetable matter, and consider the chances of sickness one step removed by obtaining it from a running stream."

The northern channel, or entrance to the port, lying around the N.W. end of Cardon Island, has a depth of 6 to 10 fathoms. The N.W. point of the island is called *Ponente Point*, and is a detached rock. The N.E. point is

* Pearl oysters are found near the South of Cardon; but few pearls, however, are found in them, and the search has been found very unprofitable.—*G. U. Skinner, Esq.*

† This port, if a settlement were established on the Islands of Aseradores, Cardon, or Castanon, would probably be more frequented; but the position where vessels usually anchor (within Cardon) to Realejo, is a sad drawback to vessels touching merely for supplies. Rum is also too cheap, and too great a temptation to seamen. Supplies of poultry, fruit, bullocks, grain, &c., are, however, very reasonable, and of very superior quality; turkeys are said to attain an incredible weight; they still, however, justly maintain a very high reputation.—*Sir Edward Belcher, 1838.*

‡ "This is a very sickly place, and I believe hath need enough of an hospital; for it is seated so nigh the creeks and swamps that it is never free from a noisome smell. The land about it is a strong yellow clay, yet where the town stands seems to be sand."—*Dampier, vol. i. p. 221.*

§ "We established our tide-gauge on the Island of Aseradores, although directly open to seaward through Barra Falsa, and we were fortunate to find a good well of water close to the beach."—*Sir E. Belcher, vol. i. p. 28.*

Cardon Head, and is 30 feet high. The channel passes round close against this point, and all over towards the South end of Aseradores Island the water is very shallow, and a large patch, the *Sawyer Bank*, is nearly awash.

A reef extends from the West point of Cardon to two cables' lengths, and a rock of 11 feet water was discovered by Commander Paynter, R.N., in H.M.S. *Gorgon*, in 1849, lying to the northward of the island. From it Icacos Point, the South end of Aseradores Island, bore E. by N., Cardon Head, E. $\frac{1}{2}$ S., and Point Ponente, the N.W. point of Cardon S. by W. $\frac{1}{2}$ W.

The CARDON CHANNEL, that North of the island is the best, perhaps the only one advisable, since the re-examination of the entrance in 1865.

The mark given for taking this channel, called the *Cardon Channel*, is—run toward the entrance, with Cardon Head the N.E. point of Cardon, and Icacos Point the South point of Aseradores touching, when they will bear East (by compass), and when at more than a cable's length from Point Ponente stand off N.E. by N. until Castañon Bluff opens out from Cardon Head, and then haul close round Cardon Head, as the current sets direct on Sawyer Bank.

Cardon Island is three-quarters of a mile in length, N.W. and S.E. Shoal water extends some distance off its seaward face. Its southern point is *Cape Austro*, surrounded by a shoal. S.S.E. of this is *Castanon Bluff*, the western point of Castañon Island. These two points are a quarter of a mile apart, and the channel between, which has a depth of 15 feet, is the *Barra Falsa*.

The mark for entering it is a *vigia* on a hill inland, or about 5 miles within the entrance, kept between the two points (Cape Austro and Castanon Bluff), and bearing about N.N.E. This mark kept on leads into the port, but as the depth had decreased from 5 or 6 fathoms in 1838 to 2 $\frac{1}{2}$ fathoms in 1863, it should not be attempted without local and recent knowledge.

The town of Realejo is up the channel which runs at the back of Aseradores Island, which is 8 or 9 feet deep.

It is high water at Realejo, on full and change, at 3^h 6^m; springs rise 11 feet.

The following are the remarks made by Mr. P. C. Allan, R.N., which will prove very serviceable:—"Vessels bound to Realejo from the southward should (passing about 20 miles to the eastward of Isle Cocos) steer to make the land to the eastward of the port during the period between November and May, as the winds prevail from the N.E., and sometimes blow with great violence out of the Gulf of Papagayo, causing a current to set along shore to the N.W.

"A range of mountains in the interior may be seen at the distance of 60 miles; the most remarkable of them is the Volcan de Viejo, the highest part of which, bearing N.E. by N., is the leading mark to the anchorage. The

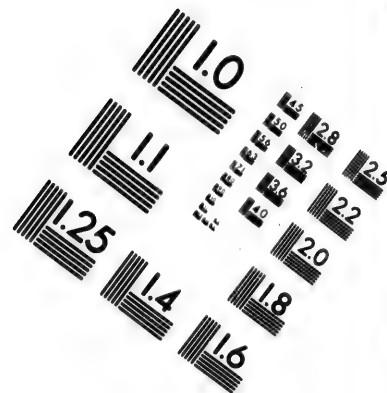
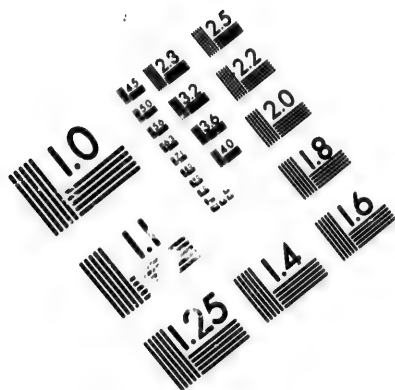
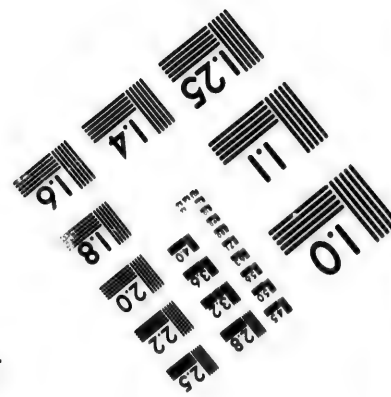
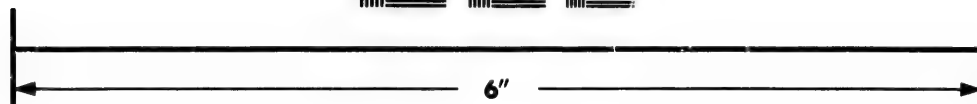
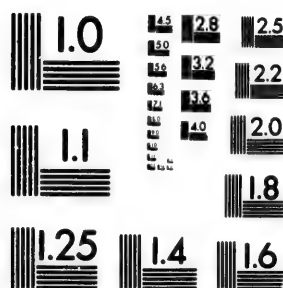


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shore, for some distance on each side of the entrance, is low and woody. Cardon Island, which is on the right side of the entrance, is rather higher, and its western end is a brown rocky cliff. The wooden tower, or look-out house, which is situated 5 or 6 miles inland, may be seen rising above the trees.

"In coming from the southward, and running along the land, ships must avoid a rocky reef, which lies about 7 miles E.S.E. of the anchorage off Realejo, on which H.M.S. *Conway* struck. This reef was examined by the boats of that ship.

"The two rocks that are above water (the one 8, and the other 5 ft. high) are distant from the beach rather more than three-quarters of a mile. The ground between these rocks, and $1\frac{1}{4}$ mile to seaward of them, and probably more, is very uneven. The rock on which the *Conway* struck lies S.S.W. $\frac{1}{4}$ W. three-eighths of a mile from the N.W. or highest of the two rocks. In passing this reef give the rocks above water a berth of 2 miles.

"The flood tide comes from the N.W. The tides are irregular; one day during our stay here it was low water 16 hours."

Mr. E. P. Brumell also says:—"In steering for Port Realejo from the southward, after passing the parallel of Port Culebra, keep the land well aboard (during the papagayos) as there is generally a strong offset. The land is low in front, without anything to make it remarkable at 8 or 10 miles off; however, there are most excellent marks inland, in the event of not getting observations. A very high peak inland, rising evenly and gradually to a fine point, bearing E.N.E., will place you to the southward of the port, and another high mountain, El Viejo, bearing N.E. $\frac{1}{4}$ N. by compass, will place you right off the port. This mountain is very remarkable, there being none other bearing the least resemblance to it, and in fact none in the immediate vicinity."

Captain Worth, of H.M.S. *Calypso*, visited Realejo in 1847, and the following are the remarks made from observation during his stay:—

"The breeze of Papagayo is always strong, and is felt 40 or 50 miles off shore, strongest nearest the land. Coming from Puntas Aronas to Realejo, although this breeze does not usually allow a ship to lay up for it at first, it will, as you proceed northward, draw more off shore, and lead directly up for the El Viejo mountain, the leading mark for Realejo.

"El Viejo is an extinct volcano, and a remarkable landmark, being the westernmost of a number of conical mountains; one of which, Momotombo, is an active volcano, and almost constantly smoking, and having the appearance of a slice cut off its top, slanting to the eastward. Westward of El Viejo the land is low, with a sandy beach, thickly covered with wood; with very clear weather, and approaching El Viejo from the southward, you will see the volcano of San Miguel (extinct), making like a round island to the westward.

"Having made out El Viejo, a N.E. by N. course leads directly up to the anchorage of the entrance of Realejo Harbour; 7 or 8 miles from the beach is 19 fathoms, shallowing quickly, but regularly, to 12 fathoms, at about 4 or 5 miles from the shore. The land to the westward is a continuous low beach, wooded close down; carrying the eye along this beach to the eastward will be observed a break, the land protruding further into the sea; the beach white, and the surf heavier, having detached trees upon it, with low abrupt cliffs, also an opening, which is the South entrance into Realejo. The island to the westward of this opening (Castañon Island) has few trees upon it, and is abrupt at the West end; to the westward of it is Cardon Island, which has many detached trees upon its West end, of larger size than upon the apparent main land (Aseradores, or Sawyer's Island), and is higher and more abrupt at this end than Castañon; there is also a large green tree jutting out from it to the westward, and a higher rock close to it, which can be seen as soon as the island itself.

"The face of Cardon Island is of a reddish-brown colour, occasioned by burning the bamboo, which grows thickly upon it. Having made out Cardon Island, the best anchorage is with its N.W. end bearing East $1\frac{1}{2}$ miles off El Viejo, N.E. by N., in $6\frac{1}{2}$ and 7 fathoms sand and mud.

"No ship should anchor to the northward of the West end of Cardon bearing E. by S., as the soundings shoal very quickly from 6 to 5 and $4\frac{1}{2}$ fathoms, the rise being about 11 feet, and always a swell, sometimes very heavy, the ship rolling deeply; nor is the bottom so good when nearer the beach.

"At the commencement of the dry season, the land-winds frequently last for several days together, blowing very fresh and preventing ships from entering the harbour; but as the season advances, the land and sea-breezes become more regular, but never strictly so. Sir E. Belcher's plan of Realejo is very correct, though there did not appear to me quite so much water near the East end of the North side of Cardon as laid down on it. The entrance is narrow, making it necessary to pass close to the tree on the West end of Cardon Island. A pilot takes vessels in and out, but requires to be watched, as he is not a sailor, and is old and incapable. When leaving the harbour, you should have a commanding land-wind, as the ebb sets directly across the South entrance, and very strong.

"The *Calypso* was awkwardly situated; the land-winds falling us, we drifted down towards Cardon Island, and were obliged to anchor and warp against the tide into deeper water; the anchor was let go in $3\frac{1}{2}$ fathoms, but it soon shoaled to less than 3 fathoms.

"The proper anchorage, which is nearer the Island of Aseradores than the opposite shore, is confined; the bottom soft mud: consequently, should a vessel take the ground, no damage would occur. A large frigate would find considerable difficulty in swinging here.

"Realejo is healthy during the dry season (November to April), but subject to fever and ague during the rainy season, which commences in May. Water can be had, but not very good, and is very dear; the natives fill the casks out of the river at low water, a little above Realejo. Wood is cheap, 4 dollars per thousand pieces; fresh beef is cheap, purchased by the bullock; the stock cheap and very good; fowls, $1\frac{1}{2}$ real; sucking pigs, 2 reals; ducks, 3 reals; lard, 1 real per pound; rice, 2 dollars a quintal; and vegetables scarce.

"This is the best place for stock on the whole coast. Washing is also comparatively very cheap—1 dollar the dozen. Fire-wood may be cut in any quantity, and good."

Dampier, who was on this coast in September, 1685, says:—"We had very bad weather as we sailed along this coast; seldom a day passed but we had one or two violent tornadoes, and with them very frightful flashes of lightning and claps of thunder. I never did meet with the like before nor since. These tornadoes commonly come out of the N.E. The wind did not last long, but blew very fierce for the time. When the tornadoes were over we had the wind at West, sometimes at W.S.W. and S.W., and sometimes to the North and West, as far as N.W."

Manzana Island, or *Falsa Cardon*, is at the N.W. end of Aseradores Island, which does not appear to be an island as you sail past it in 11 fathoms. Manzana is only about 18 feet high, covered with trees, whose level tops can be seen at 8 miles off, and the island has a white beach. It is nearly joined to Aseradores Island at the South end by a shallow channel. Several wrecks have occurred from mistaking this island for the true Cardon, but this error should not occur if the mountains are visible. El Viejo bears E.N.E. from Manzana and N.E. by N. from the latter. Should El Viejo be hidden by clouds, which sometimes occurs, the regular cone of the Telica volcano to the South of it, which is rarely obscured, will equally serve, for it bears East from Manzana and E.N.E. from Cardon.

The coast pursues a straight line to the *Mesa de Roldan* (Roland's or the Round Table), the seaward extremity of a small chain of hills, which is easily known by its level summit, and by the large reddish patches on its slopes, where they are not covered by trees. Between Cardon and this the bottom is very even, with a depth of 11 or 12 fathoms at 6 miles from the beach.

Speck Reef, of which we have no particulars beyond the chart, is marked at about 7 miles from False Cardon, and as stretching 2 miles from shore, with 15 feet on its outer edge. This, of course, must be considered in sailing north-westward.

Northward of the Mesa de Roldan the coast is a sandy beach, so low that it cannot be seen from the deck when in $4\frac{1}{2}$ or 5 fathoms. It curves around

to the N.W., and then it rises into perpendicular cliffs, which continue to the famous and terrible volcano of Coseguina, at the entrance of the Gulf of Fonseca. In sailing between Realejo and Fonseca there is no danger, if you do not come into less than 5 or 6 fathoms. Near to the Coseguina it may be approached within a mile, but with the flood tide it is better to keep further off, on account of the inlet into the Estero Real.

The GULF of FONSECA, or Conchagua, is about 40 miles N.W. of Realejo. It is an extensive and fine bay in the Pacific, almost unrivalled for its extent, its beauty, or its security. Though generally known by the name of the Gulf of Fonseca, it is also known by the names of Conchagua, of San Carlos, of Amapala, of Coseguina, and of Amatapa. Its shores are divided among the States of Nicaragua, Honduras, and San Salvador; its beautiful volcanic islands belong only to the two latter. Honduras possesses Amapala or Tigre, Sacate-grande or Velasquez and Disposicion, while Conchaguita, Manguiera, Martin Perez, and Punta-Sacate belong to San Salvador.

Each of the States claiming part of its shores have opened a port to commerce. That of San Carlos de la Union, belonging to San Salvador is the most important, not on its own account, but because of its proximity to the city of San Miguel, which at the time of its fairs (in February and November) is the most commercial place in Central America.

The port for Honduras, called *San Lorenzo*, is on the river Nacaome; it will only receive vessels of very light draught, and is seldom visited except by bongos. But the Honduras Government, at the instance of M. Dardano, the Sardinian Consul, has declared the anchorage at Amapala on Tigre Island to be a free port, with the hope of attracting hither, from its central position and capabilities, an entrepot of the commerce of the gulf, and perhaps hereafter of that of the whole of Central America.

Nicaragua has its port of entry on the left bank of the Estero Real to the S.W. It is merely a post occupied by a few soldiers at Playa Grande. It is rarely visited, and quite unimportant.

The inter-oceanic railway across the State of Honduras was proposed to terminate on the northern shore of the gulf. It starts from Puerto Caballos or Cortez, in the Bay of Honduras to the northward, running nearly due South to Punta Remolina on Sacate Grande, or some other point in the Gulf of Fonseca. The total length between the anchorage in each port would be 148 geographical miles. It was surveyed in 1858 by Colonel Trautwine, and verified by Colonel Stanton, R.E. It was proposed also to extend the southern terminus to Tigre Island by a pile bridge $1\frac{1}{2}$ mile long. Either this or the main land fronting the Bay of Chismuyo, or else the Island of Garova or La Union might be a terminus.

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Mr. E. G. Squier says :—The entrance to the bay, from the sea, is about 19 miles wide between the great volcanoes of Conchagua (5,720 feet in height) and Coseguina (3,000 feet in height), which stand like giant warders upon either hand, and constitute unmistakeable landmarks for the mariner. On a line across this entrance, and about equi-distant from each other, lie the two considerable islands of Conchaguita and Manguera, and a collection of high rocks, called *los Farallones*, which, while they serve to protect the bay from the swell of the sea, divide the entrance into four distinct channels, each of sufficient depth of water to admit the passage of the largest vessels. These islands are high, Conchaguita being not less than 500, and Manguera about 600 feet in height. They were formerly inhabited by Indians, who withdrew to the main land to avoid the oppressions of the freebooters during the period of their ascendancy in the South Sea. Both of these islands belong to San Salvador.

The principal islands in the Bay of Fonseca are Sacate-Grande, or Velasquez, Tigre, Gueguensi, and Esposicion, belonging to Honduras; and Punta Sacate, Martin-Perez, Conchaguita, and Manguera, belonging to San Salvador.

Velasquez, or Sacate-grande, is considerably the largest, and in common with the others, is of volcanic origin. It is 5 miles long, by about 4 in breadth. The southern half is elevated, rising in a number of peaks to the height of 2,200 feet. These elevations slope off gently to the northward, and subside finally in level alluvial grounds of exceeding fertility. These, as well as the slopes descending toward them, are densely wooded with cedar, mahogany, willowistii, and other valuable trees. The peaks themselves, as well as their more abrupt southern slopes, are covered with grass called by the Indians *sacate*, whence this island derives its name. These grassy slopes afford pasturage for great numbers of cattle, and it is said that as many as 4,000 have been pastured upon the island at a single time. For most of the year, and except in very dry seasons, there are running streams of water on the northern slopes of the island. Abundance of water, however, may be obtained by digging through the upper lava crusts, beneath which, as is frequently the case in volcanic countries, flow constant streams. The grassy peaks of Sacate Grande, as well as of the other islands, afford a source of ever-varying and eternal beauty. With the commencement of the rainy season, they are clothed with the delicate translucent green of the springing grass, which deepens as the season advances, both in colour and thickness, until all the asperities of the ground are matted over with an emerald robe of luxuriance. Then, when the rains cease, and the droughts commence, the grass becomes sere, and finally of a brilliant yellow; and the islands appear as if swathed in a mantle of golden grain, which Ceres herself might envy. Then comes the torch of the *vaquero*, which clears the ground for the future fresh and

tender blade, but leaves it browned and purpled, in sober contrast with its previous gayer garniture of gold and green.

The island of Gueguensi may be regarded as a dependancy of Sacate-Grande, from which it is separated only by a narrow and shallow strait. It has a single eminence of great beauty and regularity. The rest of the island is level, chiefly savanna, fertile, and well adapted to the cultivation of rice, cotton, and sugar. It is fringed by a narrow belt of mangroves.

The Island of Tigre, from its position, is the most important island of the bay. It is about 10 miles in circumference, rising in the form of a perfect cone, to the height of 2,590 feet. The slope from the water, for some distance inward, is very gentle, and admits of cultivation. Upon the southern and eastern shores, the lava forms black, rocky barriers to the waves, varying in height from 10 to 80 feet; but upon the northward and eastward there are a number of "playas," or coves, with smooth sandy beaches. It is facing one of the most considerable of these that the port of Amapala is situated. The water in front is deep, with clear anchorage, where vessels of ordinary size may lay within a cable's length of the shore,

Coseguina Point is the S.E. point of Fonseca Bay, upon which stands the celebrated volcano of Coseguina. It is 3,800 feet high, and is in lat. 12° 58' N., long. 87° 37' W. It was anciently called Quisiguina, and stands as before stated, on the S.E. point of the entrance. The verge of the crater which is half a mile in diameter, is elevated about 3,800 feet above the mean level; thence the interior walls fall perpendicularly to a depth of 200 feet, when the bottom of the crater becomes flattish, with a small transparent lake in its centre. One of the most remarkable volcanic eruptions on record occurred from it. It commenced on the 20th of January, 1835, and its first evidence was, as seen at 60 miles' distance, an immense column of smoke and flame emitted from the crater. At 9 a.m. a very heavy shock of an earthquake was felt; the night following five shocks; and during the 21st several shocks, accompanied with the noise resembling distant thunder, or "*retumbo*," as the Spaniards call it. On the 22nd the ground was covered with fire, ashes, or sand, darkness and the roar of the volcano prevailing. On the 23rd, the fall of ashes and noise increased till it became darker than the darkest night, and continued so till 3 p.m., when it cleared a little; everything covered thickly with the volcanic dust, the noise, and odour of sulphur, being overpowering. Its devastating effects were continued for many weeks after.

In proof of its tremendous effects, the eruption shook all the windows and doors in the city of Guatemala, which is between 240 and 250 statute miles distant, most forcibly. This was occasioned, not by the earthquake, but by the explosions transmitted through the air; this was on January 23rd, 1835. But the distance to which the thunder of the volcano was heard, and the dust felt, was very much greater than this. According to the

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official account, these were both felt and heard at Ciudad Real de Chiapas, a distance of 426 geographic miles. It occasioned very great alarm at Tonalá and other parts in Soconusco, 450 miles to the N.W.; and on the coast about Mérida, in Yucatan, 800 miles off. Those to the southward were not slight evidences, but the air was darkened, and the noises terrific, and the sulphureous vapours most suffocating. The flocks perished from the pastures being destroyed by the dust, and great sickness ensued among all from the water becoming tainted from the same cause.

In the "Jamaica Watchman" (January 29, 1835), too, it is announced that all the ships about that island were covered with the fine volcanic dust, which continued to fall for some days, covering everything.

G. U. Skinner, Esq., left the city of Guatemala and Istapa in the middle of March, passing large banks of floating pumice during the passage to Conchagua. When at many leagues' distance, they were almost suffocated by the sulphureous vapour and the volcanic dust, which obscured the sky, and settled on everything, causing most violent burning pains in the eyes.

PORT LA UNION is an inner harbour or bay of the Gulf of Fonseca; it lies on the North side, around Chiriquin or Chicarene Point, extending 8 or 9 miles inland, but the upper and N.E. sides are shallow and uncovered at low water. This contracts the limits of the port within much smaller dimensions. On these flats oysters are very abundant.

SAN CARLOS, better known by the name of **CONCHAGUA**, is situated on the South side of the port. The site is badly chosen, as the difficulty in landing is at all times great, and at low water nearly impossible; during strong northerly winds the communication is frequently cut off for days, independent of unsafe holding ground for shipping. Near Chiriquin this might have been entirely avoided. The port is entirely landlocked; in fact, a complete inland sea.

The actual town or village of Conchagua, from which this port derives its name, is situated about 3 miles up the Amapala Mountain, or extinct volcano, immediately over San Carlos.

If proceeding to La Union, and having made out the entrance and the islands, steer direct for the island Conchaguita, which may be ranged close to, so as to avoid the shoal water near the mouth of the San Miguel River, and over which the flood runs strongly. If obliged to beat in, there will be no difficulty in doing so, guided by Sir Edward Belcher's plan, or without it by the lead. You should not come into less than 6½ or 7 fathoms near the hill forming the second point, on the port hand, in entering, called Point Amapata, to the North of which is the mouth of the San Miguel, and which ought to be kept at a mile and a half distant. Before arriving abreast of the North point of Conchaguita, steer rather within Point Chicarene (or Chiriquin), so as to range the shore formed by the slopes of the Amatapa volcano. The depth is greater than nearer the islands, and you will have the advan-

tage of the flood stream, which separates into two branches to the North of Conchaguita, one following the channel, the other diverging to the N.E. A Sardinian vessel was driven on to the Negritos from want of knowing this fact.

Having doubled Point Chiriquin nearly in mid-channel, an extensive bay opens, the North point of which is filled with mud banks, which uncover at low water. A large ship should anchor before having the North point of Punta Sacate bearing East, in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, mooring to the flood and ebb. Vessels of less draught may get nearer to the village, which is 4 miles from the above anchorage, by keeping to the shore on the port hand, after rounding Point Chiriquin, and anchor at a mile or $1\frac{1}{2}$ mile N.E. of the village in $8\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, bottom of mud, and excellent holding ground, allowing room to drive in case of the North winds, which sometimes blow with great force. Vessels of 400 tons usually anchor at 2 miles S.E. of the village.

If it is not intended to stay long here, or only to procure water or provisions, you may stay in the channel between Point Amatapa and the islands Conchaguita and Punta Sacate, a little to the South of the watering place of Chiriquin, keeping as much as possible within the direction of the point, to avoid the strength of the current, and the cross sea, occasioned by the sea breeze opposing the ebb tide. You should moor N. and S.

The tides are regular, their velocity rarely attaining to 2 knots, except between Point Chiriquin and the Negritos. It is high water, full and change, at $3^h 15^m$; range at springs 12 feet 2 inches; at neaps 8 feet 10 inches.

The mud bank in front of the landing place dries out more than a cable's length at low water; it is better then to use the native canoes to pass through this liquid mud. In 1852 they were lengthening a jetty to avoid this inconvenience.

If proceeding to *Anapala* (or *Tigre Island*) steer for the steep sided channel, between Manguiera and Conchaguita, closing in with the N.W. point of the first of these islands to within 3 or 4 cables' lengths, so as to bring the second hummock of the summit of Tigre Island, or rather the part where the "sacate"* joins the trees, to bear N.E. $\frac{1}{4}$ E., the depth being from 11 to 13 fathoms. As soon as that bearing comes on, steer for it, and the lead will show a bank of sand and mud, the depth on which gradually decreases from 13 to

* Sacate is the term applied to those rare spaces, bare of trees, but covered with a species of long grass, called *sacate*, which, during the dry season, is of the colour of the ripe corn fields of Europe. This grass is burned just before the rainy season commences, and then has a red and sterile appearance. Soon after the first rains, it assumes a pale green, which looks like a plantation of sugar-canes.

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4 or 4½ fathoms, which is the shoalest part of the channel. As soon as Caracolito, a low islet, covered with bushes and scattered trees, bears N.N.E., and clears well from Tigre Island, though it is connected with it at low water, steer N.N.E. ½ E. towards a small cabin, or rancho, on the sandy beach to the right of Caracolito, approaching it till it bears N. by E., and then pass around it at the distance of 2 cables' lengths of the white house, and then the harbour will come in view, when you may anchor at 4 cables' lengths off the sandy beach, the flagstaff bearing S. 32° E., or a white house with three doorways to S. 39° E., being then in 8 fathoms, green mud, and of excellent quality for holding.

Water is procured from the wells, which are private property; that belonging to Mr. Dardano is the best and most abundant.

The Estero Real, in the southern part of the gulf, appears to be of considerable importance, as Sir E. Belcher took the *Starling* up it for 30 miles from its mouth, and might easily have gone further, but the prevailing strong winds rendered it too toilsome a journey at this period; he considered that it might be ascended much higher—the natives say 60 miles—by vessels drawing 10 feet, but steamers would be absolutely necessary to tow against the prevalent breezes.

According to Sir Edward Belcher's opinion, this unquestionably is the most advantageous line for a canal; for, by its approaching thus the Lake of Managua, the entire lake communication might readily be effected.*

Mr. G. U. Skinner says that there is considerable traffic carried on by means of bongoes, or large canoes, and that the distance from the embarcadero to the Conchagua is 65 miles.

Captain Worth says:—Leaving Realejo for Conchagua, with the land-wind, it is advisable to steer obliquely off shore to meet the sea-breeze, which takes a ship to Coseguina Point, on the East side of the Gulf of Conchagua.

* The Sirano, Siriano, or San Miguel River, has been one of the sites thought of for forming the communication between the two oceans, to be connected with the Bay of Honduras, through the transverse valley, the Llanura de Comayagua, watered on the Atlantic side by the Jagua, and on the Pacific by the Sirano, as before mentioned, and both of which are navigable, but how far, or how long, our knowledge will not determine. This scheme, therefore, is very desultory.—*L'Isthme de Panama, par M. Chevallier*, p. 72.

The town of San Miguel is situated on a plain at the base of the volcano, which is 7,024 feet high, and suddenly springs on this side to its apex, and is surrounded on its other sides by ranges of 500 to 600 feet above its level, entirely excluding it from any prospect beyond their outlines. There is nothing in the city itself which calls for remark, and its consequence arises principally from the fairs held here for the purpose of transacting the indigo trade. The fair at the period of Sir Edward Belcher's visit is the principal (November 23, 1838), and had a large quantity of cattle, horses, sheep, &c.

Sailing in the morning, you will generally reach this point late in the evening, or the next day after noon.

The Gulf of Conchagua will be well understood by reference to Sir E. Belcher's plan; there appears to be no dangers. The *Calypso* worked in and out twice, tacking at less than 2 cables' lengths from the shore and islands.* The tides are very strong: full 2 knots at full and change, which takes place at 3 p.m. About the change of the moon the land-wind blows strongly during the night and a greater part of the day; you can, however, see it coming by the foam on the water.

As in coming from Realejo you generally arrive here in the evening, it is advisable to anchor when the land wind comes off; for, should you be driven off the coast, it will take all the next day to reach the islands, and to arrive at the proper anchorage, the sea breeze being weak after such strong land winds.

In the *Calypso*, on our first going to Conchagua, the land wind came down with such force that the gulf appeared to break across; and we anchored in 18 fathoms, and worked up the next day to Chiquirin Bay.

This gulf contains the best and most easily obtained water on the coast; it is a stream running down the mountains, clear and sweet, into the bay called *La Playeta de Chiquirin*, which is just to the southward of the Chiquirin Point. You can anchor close in. The best way to water is by rafting, the water in the bay being quite smooth, you can pull well to windward, and alongside to the eddy, and then across the tides to the ship. We filled 26 times a day, although badly off for boats, having only a 28-foot pinnace. There is a surf on this beach, sometimes heavy, but seldom enough to prevent landing. Merchant vessels anchor so close, as to be able to hand their casks off with long lines. When we first anchored in this point we tried, through ignorance, to water in the Playa de Chicarene, but we found the surf so heavy, the water so bad, and such great difficulty from the tides, that we could not get more than 18 tons a day, and that after great labour to the men, and much damage to the casks and boats.

Wood is not so cheap here as at Realejo; beef about the same price, also washing; but stock is dearer, and difficult to get in any quantity; turtle is plentiful, about 2 reals for one weighing 50 lb. Sir Edward Belcher's plan clearly shows the only dangers in entering Port La Union; they are visible

* In entering the Conchagua from the westward, bring the Island of Tigre to bear exactly between the Islands of Conchaguita and Manguera, to avoid the rocks off Point Candelillo. Tigre is a high conical hill. It is thus quite safe entering to an anchorage, even at night, if this island be seen, which is seldom not the case at all seasons.—G. U. Skinner, Esq.

at low water, the only difficulty is the very great strength of tide; it is quite a sluice round Chicarene Point.

4. SAN SALVADOR.

San Salvador is the smallest of the Central American Republics, but relatively to its extent, it is the most densely populated, and has the most industry and commerce. It extends from the North side of the Gulf of Fonseca to the Rio Paza or Pazaca, about 160 miles to the westward, which separates it from the Republic of Guatemala. It has a population, according to Mr. Squier, of 294,000. It is an agricultural state, and the principal products are indigo, the chief article, sugar and maize. Indigo, produced from an indigenous plant, the *jiquilite*, is easily raised and manufactured. The coast presents, generally, a belt of low, rich alluvial land, varying in width from 10 to 20 miles. Behind this, and presenting an abrupt face seaward, is a range of mountains, or rather a broad plateau, having an average elevation of about 2,000 feet. Along this plateau there are not less than eleven great volcanoes, running in nearly a direct line from S.E. to N.W., coincident with the great line of volcanic action, which is traceable from Mexico to Chile. Its principal stream is the Lempa, which would be navigable for small steamers for probably 100 miles, but it is hopelessly barred from seaward. The chief ports, if such they can be called, with the exception of the fine harbour of La Union, are Acagutla and Libertad, mere open roadsteads, only deriving their existence and importance from their proximity to the respective cities of San Salvador and Sonsonate. Another place, *Concordia*, has been formed to the westward as a port to the town of San Vicente.

We have no proper survey of the coast; but as it has only to be known to be avoided, this want is of the less importance. The "ports," or anchorages, are only of interest.

In general, the inhabitants of Salvador have more intelligence and industry than those of the previously described States of Central America. Their government is more liberal, and the rights of person and property are more respected, and the privileges extended to foreigners are greater than those above mentioned, under a treaty negotiated by Mr. Squier, United States Minister to Salvador, in 1850.

The commerce of San Salvador is chiefly carried on through means of fairs established by the government in the districts best suited for the exhibition of the products of the State. The principal fairs are held at Chalalte-nango, San Vincente, and San Miguel. The two former take place on the 1st of November in each year; the latter, called "Fair of La Paz," on the 21st of the same month. It lasts about two weeks, and is far the most important of any held in the country. It attracts buyers and sellers, not only from all parts of Central America, but from nearly every part of the Pacific

coast, as well as from England, Germany, France, and the United States. About the only product given for the goods sent in by foreigners is the staple of the state, indigo. A second fair, called "Ceniza," takes place in San Miguel about the beginning of February. To both of these fairs large numbers of cattle are brought from Honduras and Nicaragua.

The Coast, as delineated on the chart, is taken from the survey of Don Alexandro Malaspina, in 1794, as drawn up subsequently for the Spanish Government by Don Felipe Bauza, F.R.S. In the introduction to the next chapter we have noticed the unfortunate voyage of this commander, and have there stated the reasons why we have not a more complete description of the tract he explored.

From *Candadillo Point*, the western limit of the Gulf of Fonseca, the coast is low and sandy for some distance, till we arrive at a part where it becomes higher, and in some places clifty, for about 10 miles to where San Miguel volcano bears N. 18° E., when it becomes again low and sandy to Jiquilisco and Libertad. These low beaches, particularly at sun rise and sunset, occasion such a strong mirage, that it appears as if the surf breaks much farther off than it does in reality. The soundings off this shore are regular, and increase gradually toward the offing, contrary to the opinion that the bottom is very uneven and dangerous to navigate by the lead; but it may be affirmed that a vessel will be in safety anywhere between Fonseca and Point Remedios, so long as she is in more than 8 or 10 fathoms. A more general remark may also be made, that on the whole coast of Central America, the lead will be a good guide, and that the depth above stated is generally safe, except in some places, where it would be too near the land, and 13 to 18 fathoms is a better depth to maintain.

PORT JIQUILISCO, (or *Giquilisco*), or *del Triunfo de los Libres*, according to Colonel Don Juan Galindo (an Englishman in the service of the republic), is about 24 miles beyond Candadillo, the N.W. entrance point of Conchagua.

In 1798, the Royal Consulate of Guatemala ordered Don Vincente Rodriguez del Camino to survey it. He states that it was then named the *Bay of San Salvador de Jiquilisco* (a species of plant, the *indigofera disperma*), anciently called the Bay of Fonseca. May this account for the double name applied to Conchagua to the S.E.? The name given to it by Colonel Galindo evidently has reference to one of those "triumphs," so common and so ephemeral in these distracted countries. We have therefore preferred the old name.

According to the old plan of Don V. del Camino, the anchorage is good and well sheltered. Like Tehuantepec, the coast of the main land appears to be fronted by a long narrow island, perhaps formed by the tremendous surf raised by the prevalent winds.

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The port, or rather the creek or "Estero" of Jiquilisco, has not the same appearance as the rivers, &c., to the West; instead of mangroves, the shore is marked by bushes of a pale green or muddy colour, or else without leaves. The volcano of San Miguel, kept on the bearing of N. 27° E., will lead on to the horse-shoe breakers. At a mile and a half off the water is much discoloured, but the depth is $7\frac{1}{2}$ and $8\frac{1}{2}$ fathoms, fine grey sand, which would not hold well; a better anchorage would be $1\frac{1}{2}$ mile West of the bar, where there is an adhesive mud, and black sandy bottom. We were not fortunate enough to find the channel across the bar, described by the officers of *Le Génie*, as stated below.

The bar of Jiquilisco forms a sort of horse-shoe, which must be crossed to enter the estero. The sea frequently breaks heavily on it, but there are places where it does not do so, and where it may easily be attempted in boats. There is 14½ feet least water on one part, and the tide rises $8\frac{1}{2}$ feet; it is therefore possible even for ships of considerable burden to clear this line of breakers, which is but narrow, and find plenty of water within, except on three or four small shoals, which are not difficult to avoid. One feature of the place, which will point out the channel, is that the ebb tide from the estero forms a line of eddies or ripples in which there is always deep water, and which crosses the banks in the deepest part. This current turns with the tide, and sometimes runs at the rate of 3 miles an hour, and with the flood tide makes a very heavy sea on the bar, except at the time of high water. (Captain Jamin, of the brig *Le Génie*). At the entrance of the estero is *Pajaros Island*, which separates it into two channels, in which it is said there is a depth of 8 fathoms.

The **RIVER LEMPA**, or **LAMPA**, runs within a league of one of the arms of the estero of Jiquilisco, and the inhabitants state that another branch joins the River San Miguel, which falls into the Gulf of Fonseca.

In passing along the coast of this river the navigator should be very cautious of his distance, for it is stated that a long bar or flat runs off, as indeed might be anticipated, from the magnitude and character of the river. This flat, which reaches the greater part of a mile, is called the *Barra del Espíritu Santo*, and on it the *Lucretia*, a brig drawing 12 feet, was wrecked, February 18, 1847. This was in consequence of the ignorance of the existence of such a projection.

In Father Gage's work, before quoted, he mentions the Lempa:—"This river is privileged in this manner, that if a man commit any heinous crime, or murder, on this side of Guatemala and San Salvador, or on the other side of St. Miguel or Nicaragua, if he can flee to get over this river, he is free as long as he liveth on the other side, and no justice on that side whither he is escaped, can question or trouble him for the murder committed. So likewise for debts, he cannot be arrested."

Among the many undeveloped resources of San Salvador, *con'* may come
North Pacific.

to have a first value. Mr. Squier says that there is reason to believe that vast beds exist throughout the valley of the Rio Lempa, and in the valleys of some of its principal tributaries, over a region 100 miles long by not far from 20 miles broad. It had long been reported to exist, but he set the question at rest after his visit in 1853, by proper investigations. Coal was found in the valley of the Rio Titiguapa, flowing into the Lempa from the coast, also in the valley of the Rio Tordila, and large beds are reported to exist near the town of Itobasco. The coal is all of the variety called *brown coal*, and is a later formation than what is known as pit coal; similar coal is extensively used in Germany for various mineral purposes.

The entrance to the Lempa River is similar in character to the others West of it. It is known by some large trees with white trunks, with the tops almost bare, rising above the lighter coloured and lower wood, similar to the copsewood of northern countries. It is found when coming from the East or South, by bringing San Salvador to bear N. 50° W., or San Vicente N. 16° W., and then running on either of these bearings will bring up to the bar. Coming from the westward, San Miguel bearing N. 60° E., will bring you up to it. The entrance is about half a mile broad, barred by breakers, which reach a mile out, and which the natives say cannot be taken. It is quite unimportant, and there are only a few fishing huts on its left bank.

Above this port and the mouth of the river the *Volcan de San Miguel* rises. It is 7,024 feet high, and is a very conspicuous object in the offing, and will serve well to point out the locality.

LA CONCORDIA, a "port" of late growth, is at the mouth of the *River Jiboa*, 11 miles W.N.W. of that of the Lempa. This river drains the Lake of Itopango, but we have no particulars of the anchorage.

PORT LIBERTAD is about 50 miles to the westward of the Lempa. It was visited by H.M.S. *Sulphur*, and we copy her commander's observations on it.

One would naturally expect from this title that something pretending to a bay, or deep indentation at least, would have warranted the appellation. But a straight sandy beach, between two slightly projecting ledges of rock about a mile asunder, forms the *plaza* of Libertad. It is *law* and *interest* only that have made it a port.

At times the bay is smooth, but the substratum at the beach being of large smooth boulders of compact basalt, the instant the surf rises they are freed from their sandy covering, and a dangerous moving strong bottom left, on which the boat grounded. We were informed that it is generally violent for three or four days, at full and change, which corresponded to the time of our visits.

The rollers which set in on this beach curl and break at times in 4 or 5 fathoms, at least a quarter of a mile off. Those within, which are the most dangerous, are caused by the offset or efflux.

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The sand beach is composed chiefly of magnetic iron sand, the dried superstratum, about one inch in thickness, caking in flakes free from admixture.

The anchorage is uneasy, and I should think unsafe, and should be avoided near the full moon. Sudden rollers come in, which are apt to snap chain cables, unless with a long range.

Poultry, bullocks, &c., are to be obtained, but compared with those of San Salvador or Realejo, the prices are exorbitant. Bullocks can only be embarked in one of their bungoes.

The port, after this, was for a long time deserted, but when Captain de Lapelin came here in 1852, it had been reinstated, and the custom-house stores re-built. A launch was also maintained, going out and returning by means of the andarivel. The mark for approaching it is to bring the volcano of San Salvador to bear N. $\frac{1}{2}$ E., which bearing will lead up to it.

When at 8 miles off the depth will be about 25 or 27 fathoms, muddy bottom, which depth will gradually decrease toward the shore. At about 6 miles off you will begin to make out the large storehouse covered with trees, and with whitewashed walls, having a flagstaff to the East, and a white house to the West; when nearer you will see the tops of the palmetto trees and some huts. When a mile off the place the depth will be about 8 $\frac{1}{2}$ fathoms. Water may be got though with difficulty, from the little *River Quelama*, which falls into the sea at less than half a mile West of the village. Capt. De Lapelin adds his opinion that this place should not be frequented between July and October.

SAN SALVADOR, the capital of the republic, is to the N.E. of Libertad. They are connected by a cart road 26 miles long.

Sir Edward Belcher visited this city in April, 1837, going thither from Realejo, the road being through a very mountainous tract. The town is very prettily situated on a level plain, or amphitheatre, from which several lofty mountains rise, that of the Volcan de San Salvador being the most conspicuous.* San Salvador was the capital city of the confederation of the

* When we first saw the mountain of Guatemala, we were, by judgment, 25 leagues' distance from it. As we came nearer the land it appeared higher and plainer, yet we saw no fire, but a little smoke proceeding from it. The land by the sea was of a good height, yet but low in comparison with that in the country. The sea, for about 8 or 10 leagues from the shore, was full of floating trees or drift wood, as it is called (of which I have seen a great deal, but nowhere so much as here), and pumice stones floating, which probably are thrown out of the burning mountains, and washed down to the shore by the rains, which are very violent and frequent in this country.

The Volcan of Guatemala is a very high mountain, with two peaks or heads, appearing like two sugar-loaves. It often belches forth flames of fire and smoke from between the two heads, and this, as the Spaniards do report, happens chiefly in tempestuous weather.—*Dampier*, vol. i, pp. 225—230.

States of Central America, and in imitation of the Washington in the United States, it had a Federal district assigned to it, which included the Port of Libertad, but this confederation was dissolved in 1839. It was a very handsome city, of 25,000 inhabitants, with fine churches and public buildings: but on April 16th, 1854, at 10 minutes to eleven, such a terrific earthquake occurred almost without the slightest warning, that in ten seconds the entire city was thrown into heaps of ruins. It was then nearly deserted, and the seat of government was removed to Cojutepeque, about 12 leagues distant. But it is now in course of being rebuilt, the people having generally returned, and it may soon regain its former position.

Under the auspices of a late President, Dueñas, the cart road was nearly completed to Libertad, a distance of about 22 miles.

The **COAST** between Libertad and Acajutla is very uneven, covered with trees, or with reddish-coloured barren patches. On the sea it forms cliffs, bordered by a beach of shingle. It is known as the *Costa del Balsamo*, as the Indians here collect the "Balsam of Peru." It is, however, quite clean, and may be approached within view of the breakers.

A district along the coast, between the Ports of Libertad and Acajutla, is called, as above said, the *Costa del Balsamo*; it produces an article known commercially as the Balsam of Peru, from its having been sent to Lima for export to Europe. It is collected solely by the aboriginal Indians who inhabit that district. About 20,000 lbs. (valued at two shillings, or 50 cents.) are obtained for annual export.

Indigo is the chief article of export. Under the Spanish rule, the value of this article amounted to 3,000,000 dollars per annum; but since the independence of the state, it has sunk to little more than 1,000,000 dollars.—(Dr. Otis.)

PORT ACAJUTLA, or **Sonsonate Roads**, is the next attainable point beyond Libertad.

The principal town of this port is Sonsonate,* which is situated about 15 miles inland. There is also a small village on the coast which gives its name to the port; it consists of about thirty habitations of various descriptions,

* Sonsonate, or Zonzónate, derives its name from the Rio Grande, formed by almost innumerable springs of water, to which the name of *Zozontlatl* is given, a Mexican word meaning 400 springs, corrupted to Zonzonate.

"Santissima Trinidad de Zonzonate is situated on the Rio Grande. It is a pleasant town, although the climate is very hot. Each of three monastic orders have (had) a convent here. The church is very spacious, besides which there are three oratories. On the opposite side of the river it has a suburb called the Barrio del Angel, on which there is a chapel. The communication between the town and the suburb is by means of a stone bridge. In the vicinity are three small Indian villages, &c."—Don Dom. Juarros: *Translation by Mr. Baily*, p. 28.

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most of them of the meanest order; they are constructed of bamboo open work at the sides, and the top is rudely thatched of palm leaves, which latter is, however, made impervious to the heavy rains that fall almost perpendicularly in the wet season. The tile-roofed custom-house stores is one of the most conspicuous buildings, and there is also still remaining the ruins of an old Spanish fort, in which is situated the dwelling-house of the governor. This officer performs all the official duties of captain of the port, administrator, &c. The business of the port had increased considerably in consequence of the duties being lower than in Guatemala.

Vessels leaving Europe in August, September, October, November, and December, are sure to arrive during the best season for disembarking on the coast. No vessel should arrive later than the middle of April, as after that date the rains set in, and a heavy sea rolls in upon the coast, which prevents the launches from venturing out.

The port consists of an open bay, of which Point Remedios is the eastern boundary. There is anchorage all over it at a prudent distance from the shore in from 7 to 15 fathoms water; the bottom appears to be of sand, with here and there a patch of mud. Large vessels should not anchor in less than 12 fathoms.

The surf breaks heavily on the beach, which renders landing in ships' boats almost impracticable. The usual mode of effecting this object was in large canoes or bongoes, which are kept for the purpose of discharging cargoes. There is generally one of these kept afloat, moored just without the surf in the N.E. corner of the bay, near where the village is situated: persons desirous of landing usually pull in in their own boats, transfer themselves, with a portion of their crew, into the bongo, and haul in through the surf to the beach by a line fast to the shore for that purpose. To get on shore dry, they will then require to be carried out through the receding surf, which is about 1 foot or 18 inches deep. This contrivance, called at Istapa the *anda-rivel*, is described more fully on page 73.

Formerly this mode of landing and embarking was the only one practicable, but the increasing commerce of the place, and the fact of a steep flat rock projecting from the shore about 70 feet at three-quarters of a mile from the original landing place, and being deep water close up to this rock suggested to Dr. Drivon, a rich proprietor, the formation of a pier.

The rock had long been called *El Muelle*. The pier was completed in 1854, and consists of a substantial timber construction leading on to this rock, and has a crane by which the ships' cargo is discharged or embarked. In front of the rock is a channel of 11 or 12 fathoms depth, and it is said that no sea is sent into it sufficiently heavy to affect a vessel made fast to the four moorings placed there for the purpose. This immunity from danger may be doubted in some degree, but its safety is well understood by the local pilots. Water is conducted to the pier-head, so that it may be taken on board by a

hose. By giving two days' notice, fresh provisions may be obtained in large quantities from Sonsonate.

Point Remedios has a reef off it extending in a south-westerly direction nearly 3 miles in fine weather. This reef scarcely shows itself, therefore more caution is necessary in rounding it. Vessels of a light draught have frequently passed safely over the outer part of it unknowingly, whereas several others, less fortunate, have been brought up by detached rocks, and a total wreck has ensued. The point is long and low, thickly wooded, and from the eastward easily recognized.

Beef, poultry, vegetables, and fruit, are plentiful and cheap. Water is plentiful on shore, but the difficulty of getting it off through the surf is very great; however, if much wanted, it may be had with a little extra labour and perseverance.

The mark for anchoring was, in 1852, the flagstaff on with the large door of the custom-house store, in 7 to 14 fathoms, according to the season. The flagstaff should not be brought N. of N. 61° E., particularly when near the land, as the bottom will then be rocky, and there is the chance of breaking or losing the anchor. The bottom is not good holding ground, and vessels sometimes drive. In the fine season the current generally runs to the E.S.E. at the rate of eight-tenths of a mile per hour. It is high water, at full and change, at $2^h 35^m$; greatest range 11 feet.

H.M.S. *Havana* anchored here in May, 1859, in 12 fathoms, with the landing place N. 55° E., and Point Remedios N. $81^{\circ} 25'$ E., the shoal off the latter sheltering her from the S.E.

Captain Harvey says:—Here we found a substantially built wharf, at which there is generally fair landing, although at times the surf is such as to prevent any approach. Merchant vessels discharge and receive cargo by their own boats. Beef, stock, vegetables, and fruits may be obtained in any quantity from Sonsonate; but two days' notice must be given to secure having any considerable amount. The pier, happily, is provided with cranes, which were useful in getting off bullocks. A vessel should stand no nearer to the Remedios Bank than to 20 fathoms without a good breeze and clear weather. The volcano Isalco was burning the whole of the stay. No lighthouse gives a better light; the bearing, N.E. by N. is a good mark for the port.

The following observations on this port, and on approaching it, are by Captain Worth, of H.M.S. *Calypso*, in 1847;

Acajutla, or Sonsonate Roads, although not much known, is safe, the oldest inhabitant remembering only one wreck: the reef off Remedios Point breaks, the sea setting directly into the anchorage. Here the salt water is very injurious to the cables and copper; although at anchor not more than a fortnight, the cable and anchor were completely covered with small shell-fish, as also the boom boats; this remark is applicable to all the ports we visited on this coast, though not so much as at this place.

The passages to the westward are uncertain as to time, the land and sea breezes being so very unsettled.

The land-breeze always blows (if ever interrupted, only for a short period) at all the ports we visited, except Conchagua, and is nearly always sufficient to take a ship to sea. As a rule, I should recommend, on leaving any port, that you stand off shore, always bearing in mind that the sea-breeze is from South to S.W. There is a current always setting to the S.E.

Between Conchagua and Acajutla the passage is very tedious, being never less than two days, and sometimes five, and even longer, the land-breeze being not to be depended on, and the sea-breeze often very light, although at times the sea-breeze will blow very fresh indeed. The best plan, after leaving Conchagua, is to stand rather off shore, so as to make a long leg off with the sea-breeze.

The coast is quite clear, there being anchorage nearly all along it.

We found the sea-breeze seldom set in before noon, and often later, and a continual set to the S.E. The leading mark for Acajutla is the Isalco Volcano, which smokes, and frequently sends up large jets of fire. On a N.E. by N. bearing it leads to the anchorage off Acajutla. Point Remedios, long, low, and thickly wooded, may easily be recognised.

This anchorage is difficult for a stranger to find; the best plan is to take notice of the several volcanoes on the coast, after leaving Conchagua; viz., San Miguel, San Vincent, and San Salvador. The land is a low beach, the soundings decreasing gradually to 10 fathoms, at 3 or 4 miles off shore, until the volcanoes are past, when it becomes tolerably high, and has 25 fathoms at a little distance from the beach, particularly in the bight to the S.E. of Point Remedios, where in that depth the surf can be heard quite distinctly. Point Remedios, which runs out from this moderately high land, is low, and thickly wooded, appears to stretch a long way into the sea, and has several black rocks, one nearly a solid square, lying just off it; these rocks are the inside part of a reef extending 3 miles in a S.W. direction, on which the sea breaks heavily at times. On the S.E. side of this point the beach is clear, having no rocks upon it; but on the N.E. side it is broken by rocks and clumps of trees, dividing it into a number of small sandy bays. Should you not be close in, you cannot make the point out, as it appears part of the low, thickly-wooded land that stretches from the before-mentioned moderately high coast to the westward of Istapa.

The Volcano of Isalco, 5,000 feet high, is decidedly the surest mark, bearing N.E. $\frac{1}{4}$ N., if it can be made out; but, as it does not smoke constantly, and is situated on the side of, and is lower than, the mountains behind (Sierra Madre), it is very difficult to find.

The Madre, and mountains to the westward of Isalco, are very high; it may be known by the table-land top, in which it differs from the others, they

being conical, or approaching that form. The Isaleo is a conical volcano, apparently on the East side of the Madre, and the crater is about one-fourth down from the table land.

The coast between Acajutla and San José or Istapa, a distance of 56 miles runs W.N.W. and E.S.E., with scarcely any inflexion; it is throughout of gray sand, wooded to the shore, and beaten by a continual surf. Here and there the vegetation is of a paler green, and the whitened stems of the mangroves indicate the impassable entrances of the *Rios dos Esclavos*,* *Pazas* (the state boundary), *Santiago*, and *Caoba*. There is no danger off shore, and the depths are regular, of sandy mud. The current runs from West to East, at half a mile to one mile per hour.

The best course to pursue in coming from Acajutla to Istapa, or rather San José, is to keep 2 or 3 miles off the land, in 16 or 25 fathoms, so as to take advantage of the land breezes, which are generally light. The sea breeze often sets in from S.W. to W.S.W., and then you can beat in shore into 12 fathoms. The lead is an excellent guide, and there is nothing to fear, as the depths diminish regularly. But when the sea breeze sinks about 6 p.m., and the land breeze will not give you a way of 3 knots, it is better to anchor at once, or you may lose ground.

5. GUATEMALA.

The Republic of Guatemala is the principal state of Central America, in respect of population and wealth. It is generally mountainous, but a large part of the interior consists of elevated lands of unsurpassed beauty of scenery, of vast fertility, and unquestionable salubrity. Its great deficiency is the want of ports on either ocean, and this fact will act as a great check on its commercial progress. On the Pacific it extends from the River Pazas to the confines of Mexico. This last boundary has been the subject of long dispute, but it was settled in 1854 by Guatemala ceding all right to the rich district of Soconusco, extending for nearly one hundred miles along the Pacific, on the payment by Mexico of a considerable sum. The rivers falling into the

* "The *Rio de los Esclavos*, which falls into the sea West of Acajutla, is described by Stephens as a wild majestic river. He crossed the bridge over it, erected under the Spanish dominion, and the greatest structure of that period. The village beyond was a mere collection of huts, standing in a magnificent situation near the river, and above which mountains rise covered to their summits with pines. Every predatory or fighting expedition between Guatemala and San Salvador passed through this miserable village. Twice within his route Morazan's army was so straitened for provisions, and pressed by fear of pursuit, that huts were torn down for firewood, and bullocks slain and eaten half raw in the street, without bread or tortillas. After leaving this village, the country was covered with lava."
—*Incidents of Travel.*

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distance of 56 miles it is throughout of surf. Here and there are of the mangroves * *Pazas* (the state shore, and the depths to East, at half a

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Pacific are few and small, the largest is the *Michitoyat*, which passes the capital, but none of them can ever be of use to navigation

The famous volcanoes which are such a distinguishing feature of this great isthmus are here seen in their greatest majesty, and the Volcans de Agua, 14,500 feet, and Fuego, 13,900 feet (near Old Guatemala), and Atitlan 11,000 feet, have been very frequently described. The present capital is Nueva Guatemala, the third city of its name, and was founded in 1776. It stands at an elevation of 4,400 feet, in a vast and beautiful plain inland of its new port, San José. Cochineal, coffee, cotton, and indigo, are the chief products for export, but the first is the great staple of the country. Like its neighbour, the commerce of the republic is largely indebted to the various fairs which are held in different parts and in different seasons.

ISTAPA, or *Istapam*, at the mouth of the River Michatoyat (or Michitoyat), is the outlet of the Lake of Amatitlan, and is said to be navigable from the Falls of San Pedro Martyr, 70 miles from its mouth. It was from the first the port of Guatemala, but it was closed on January 1st, 1853, when the port of San José, 8 miles to the westward, was declared to be the new port. This change was nautically unimportant, for both places were alike, wild open roadsteads, without a single attribute to give it the name of port. The village now consists of a few grass huts.

Istapa was an open roadstead, without bay, headland, rock, or reef, or any mark whatever to distinguish it from the adjacent shores. "There is no light at night, and vessels at sea take their bearings from the great volcanoes of the Antigua, more than 60 miles inland. A buoy was anchored outside of the breakers, with a cable attached, and under the sheds were three large launches for embarking and disembarking the cargoes of the few vessels which resort to this place. Behind the sand-bar were a few Indian huts, and Indians nearly naked. Generally the sea is, as its name imports, pacific, and the waves roll calmly to the shore; but in the smoothest times there is a breaker, and to pass this, as a part of the fixtures of the port, an anchor is dropped outside with a buoy attached, and a long cable passing from the buoy is secured on the shore.* It was from this place that Alva-

* The discharge and loading of vessels lying off Istapa, and other places on this coast, which is not effected in the easiest manner through such a tremendous surf lashing the shore, is done by means of what is called here the "*anda-rivel*," Anglicè, "guess-warp," above alluded to.

This contrivance consists of a cable made fast to a strong post on the shore, the outer end of which is secured by an anchor some distance outside the surf. Within this anchor, which is marked by a buoy, but still sufficiently clear of the broken water, is another buoy attached to the warp, by means of which the strong launch employed is seized to it, or casts it off. The launch having been brought to the warp buoy, the warp is thrown into rowlocks, one on the bow, the other on the stern of the launch. These are then bolted in with a pin to prevent their slipping off, and secured by a stopper, wormed round it near

rado fitted out his armament, and embarked with his followers to dispute with Pizarro the riches of Peru.—(*Stephens.*)

The usual anchorage was with the flagstaff bearing between N. by E. and N. $\frac{1}{2}$ E. at half a mile off shore in 14 to 16 fathoms. It is best to anchor to the East of these bearings, as there the boats in landing have the advantage of the current which runs to the eastward at from 8-10 to $1\frac{1}{2}$ mile per hour.

Mountains.—The following remarks are by Mr. H. Thompson, master of H.M.S. *Talbot*:—The whole of this country is remarkable for its mountainous ranges, which may be seen in clear weather from a great distance seaward. Many of their lofty peaks and volcanoes serving admirably as beacons to guide strangers to the various little ports and roadsteads situated on its coast, which otherwise would not be easily found. Such is the case when bound to the roadstead off the village of Istapa. There are visible from the vicinity of this roadstead, to many miles seaward, four conspicuous mountains, which are situated as follows: commencing with the easternmost one which is the volcano of Pacayo; next West of this is the water volcano (Volcan de Agua) of Guatemala; then the fire volcano (Volcan de Fuego) of Guatemala, and the last and westernmost is the volcano of Tajumuleo. The first and last of these volcanoes are of a moderate height, and flattened or scooped out at the top; but the two middle ones, which are the volcanoes of Guatemala, are considerably higher, and much more peaked at their tops. The easternmost one of the two last-mentioned is the water volcano; it has but one peak, which at some periods of the year, is slightly snow-capped, and from the holes and crevices near its summit ice is procured the whole year round for the luxurious inhabitants of Guatemala. The fire volcano is to the westward of the last-mentioned, and appears to have two peaked summits, which open and close according to their bearing. From the roadstead it has the appearance of one mountain with a deep notch in its summit. The upper part of this mountain has a whitish appearance, which might be mistaken for snow; but I am informed that it is caused by the action of fire. Smoke is constantly emitted from it, and may be seen from the sea in clear weather. From the anchorage at Istapa the true bearings of these four mountains are as follow: viz., volcano of Pacayo, N. 22° E.; water volcano

the bolts. The *bogas*, or watermen, watch the heaves of the sea, which, singularly enough, are always heaviest in threes, and when the heaviest wave approaches, the pilot gives the signal, the lashings which secure the bow and stern are slipped, and at the same moment the hands haul in the warp; while running on the tremendous wave she is propelled with immense rapidity, and is usually driven on to the beach with the succeeding wave, where generally forty or fifty Indians, with the fall of an "*aparejo*," or treble-purchase line, which is hooked to a ring on the launch's stern-post, and secured to the post, haul her high and dry with the next wave. It sometimes happens that the *practico*, or bowman, does not take the right sea, and then a larger break over her, swamping the launch, or damaging the cargo, or perhaps losing it.—*G. U. Skinner, Esq.*

of Guatemala, N. 5° E.; fire volcano of Guatemala, N. 8° W.; and the volcano of Tajumulco, N. 28° W. The thatched roof of a large hut, in the village of Istapa, which was just visible over the high white beach, then bore N. 17° E., distant about 2½ miles, and the depth of water was about 17½ fathoms. The above bearings of either of the volcanoes of Guatemala nearly on will guide a vessel to within a few miles of the anchorage, and sufficiently near to make out the thatched roof of the above-mentioned hut, which is the only object that marks the spot, the remaining small huts, which constitute the village, being hidden behind the beach. There is also a small flagstaff close to the largest hut; but, unless the flag be flying, it is difficult to distinguish it, in consequence of its being mixed up with the trunks of trees that stand behind it. The entrance to the river is choked up by the sea-beach, through which it has not strength enough to force itself. The village of Istapa consisted of about fifteen huts, which afford shelter to about forty or fifty inhabitants, who occasionally find employment in discharging merchandise from the very few vessels that call here.

In the bad season I should imagine this a very unsafe place to anchor at, owing to its being entirely exposed to the ocean swell, which, with the southerly winds, is exceedingly heavy. Landing is only practicable in the finest weather.

SAN JOSE DE GUATEMALA, the new port of Guatemala, established January 1, 1853, is at a place previously called *Zapote*. There is not the slightest shelter, and there is always a very heavy swell, and rollers occasionally.

The coast is very clear, running East and West. The anchorage is about three-quarters of a mile from shore, in 11 to 15 fathoms of water. The swell breaks heavily upon the shore, and out as far as 40 or 50 fathoms from the beach, making it necessary to use the girt line (anda-rivel) for landing and leaving. The currents are very strong, and vary with each change of the moon, the variations sometimes taking place within the short period of six hours. From November to February the landing is easy. In March the ebb and flow of the tide extends from 90 to 100 yards over the shore, and at the flood-tide the surf is so heavy as to dash up the beach a distance of 100 to 120 yards. After March the sea is again calm till July, and from July to December it is again rough, and the landing difficult.

An *iron screw-piled pier* is in course of construction by the government of Guatemala, extending from the shore to a point beyond the breakers, thus enabling the transportation between ship and shore to be performed at every season of the year with facility and safety.

The town of San José has a population of between two and three hundred. Supplies for vessels are, however, procured with much difficulty here, unless provision be previously made to obtain them from Escuatla, a town 40 miles distant, on the road to the capital. There are no means of refitting or re-

pairing vessels at present. The modes of conveyance to the interior are by mules and stages, and are sufficient. Diligences await the arrival of the Panama railroad company's steamers, for conveying passengers to the capital, 90 miles distant, and the roads in the dry season are excellent. In the wet season the roads are bad as far as Escuintla.

Captain T. Harvey, R.N., who came here in H.M.S. *Havard*, in May, 1859, says that the place is utterly undeserving the name of a port, although it is the only landing-place for goods for Guatemala. The anchorage affords no shelter whatever; the surf has its full force. The only way a landing can be effected is by means of a surf-boat, and even this was capsized four times during our stay. The town of San José consists of some half-dozen grass huts and a flagstaff, which cannot be distinguished beyond five miles from the shore. The current generally sets to the westward, and yet a continuation of westerly winds will alter it.

Capt. G. F. Emmons, U.S.S. *Ossipee*, who came here, in 1868, says—San José is becoming a port of some importance as the only landing-place for goods on the coast of Guatemala, with this exception, it has no claim to the name of a port, being merely an open roadstead. The few grass houses composing the town are built among the trees on a high dark sandy beach, a large white storehouse which can be seen at a distance of 6 miles forms the only mark on the coast for the port.

The anchorage is opposite this house in from 8 to 13 fathoms sand, distant about 1 or $1\frac{1}{2}$ mile from the land. A heavy surf breaks on the shore, and the communication is carried on by means of hawsers attached to buoys moored off the beach, but the iron pier, in the course of construction, will facilitate commerce. A steamer from Panama calls here once a fortnight.

There is some difficulty in finding the anchorage of San José, the coast line in the neighbourhood being one unbroken line of beach and trees; the best marks, however, on coming from seaward, are the remarkable volcanic peaks of Guatemala, generally visible at dawn. Four of these peaks can be seen from the anchorage on the following bearings:—Tajumulco N.W. $\frac{3}{4}$ N., El Fuego N. by W. $\frac{1}{4}$ W., La Agua North, and Pacaya N. by E. $\frac{1}{4}$ E. El Fuego and La Agua being the nearest and most conspicuous, the former may be known by a deep notch in its summit, while the latter being brought to bear North, forms the best guide till the white storehouse can be distinguished.

The position of this anchorage has been determined from several authorities to be in lat. $13^{\circ} 55' N.$, and long. $90^{\circ} 45' W.$

Of the coast of Guatemala to the W.N.W. of Istapa we have no particular account. From Malaspina's survey there does not appear to be any port, and the ocean swell must set on it with more than ordinary force. To the sailor, then, it is unimportant. The republic extends to the boundary of that of Mexico, once fixed at the River Sintalapa (or Tilapa), a distance of

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ve have no particular pear to be any port, inary force. To the s to the boundary of ilapa), a distance of

180 miles from Istapa. It forms the southern side of the province of Suchiltepeques, and is the eastern portion of the extensive bay called the Gulf of Tehuantepec.

The Province of *Suchiltepeques* is bounded on the West by the Mexican province *Soconusco*, and extends along the Pacific 32 leagues. It was much more populous formerly than in Juarros' time. The climate is warm, but less so than *Soconusco*. The province is watered by sixteen rivers; of these the *Samala*, which discharges itself into the sea, under the name of the *Xicalapa*, is the most important. It is fertile from its situation, and abundance of water; the chief article of commerce is cocoa, so excellent in quality as to be preferred by many to that of *Soconusco*.

CHAPTER II.

THE WEST COAST OF MEXICO, BETWEEN TEHUANTEPEC AND MAZATLAN.

THE coast described in the present chapter may be said to be that of the South extreme of the North American continent, and is the southern seaboard of the provinces of Chiapa, Oaxaca, Puebla, Mexico, Valladolid, and Guadalajara, portions of the Mexican republic.

Our geographical knowledge of the republic, generally, is very incomplete and unsatisfactory. On the Pacific shores, if the commercial importance of its few ports were at all commensurate with the natural riches of the districts of which they might be the outlets, navigators would be much embarrassed by the deficiency of our charts and descriptions. But as few points are visited for any purposes of trade, we have tolerably accurate and recent descriptions of those ports; and in the ensuing pages it is hoped that there will be found ample notices to allow the ship-master to approach them with confidence and safety.

Mexico, as is well known, has been the scene of constant intestine warfare and change for many years past; and to this evil must be added the very great ignorance of the great mass of the people—a startling fact in a *republic*, the basis of whose safety is the capacity of the people for an intellectual self-government.

When Nunez de Balboa first landed on its shores (in the Mexican Gulf), Montezuma I. was emperor, and had extended the Aztec dominions to the Pacific. The conquest of his kingdom by Cortes is well known, and Mexico became a vice-royalty to Spain; and, with powers almost as absolute as that of the parent monarchy, Mexico was scarcely known to Europe, except by its issue of the precious metals. When Charles VI. of Spain abdicated in 1808, the royal authority here received a shock from which it never recovered; for an open insurrection broke out in 1810, and a national congress assembled in 1813, one of the earliest acts of which was a declaration of the in-

dependence of Mexico. Subsequently, the history is one of a sanguinary guerilla warfare, until, in 1821, Iturbide was made emperor, under the title of Augustine I. He soon abdicated and retired, but returning, he was apprehended and executed. The government was then modelled on a similar constitution to that of the United States; but the original party divisions remained, though under different names. The campaign which led to the annexation of Upper California to the United States in 1847 led to no internal amelioration, and the first hopes of the world were defeated, when the state was destroyed as an empire by the death of the heroic Maximilian. To these disturbances, and consequent insecurity of property, must be attributed the embarrassments of commercial enterprise, the enactments of the law, and the long train of evils which lie so heavy on this fine country, and its otherwise, in many respects, good population.

The country of Mexico, especially that part on the Pacific, is divided by the natives into *tierras calientes*, or hot regions; the *tierras templadas*, or temperate regions; and the *tierras frias*, or cold regions; the first including those beneath the elevation of 2,000 feet; the latter tract occupies the most important part of Mexico, and, in fact, is that vast plateau on which Mexico stands. On the low lands of the coasts the heat, during part of the year, is insupportable, even by the natives, and thus the town of San Blas becomes annually depopulated for a season.

The Cordillera or mountain chain, which, in the southern Andes, is a well-marked line of lofty ranges, and less distinctly so in the North and throughout Guatemala, in Mexico divides to two somewhat indistinct branches, following either coast. That to the South is irregular, and in some parts but little known. At the head of the Gulf of Tehuantepec it is about 60 miles off the coast, on an average, but leaves many valleys of slight elevation between the detached portions of it. To the mariner most of them are unimportant, unless we mention the volcano of Colima, which becomes an excellent landmark for that portion of the coast. Most of the peaks are volcanic, some in activity; and the usual volcanic phenomena of eruptions and earthquakes are frequent, the latter particularly so; and many severe visitations of this sort are upon record. At Acapulco this becomes a serious bar to its permanent prosperity.

Of our hydrographical knowledge of the Pacific coast a word may be said. With some detached portions we are intimately acquainted, through the excellent surveys made in 1837-8, by Sir Edward Belcher, of the English navy, when on this coast in H.M.S. *Sulphur*. These points of Guatulco, Acapulco, San Blas, Chamatla, and Mazatlan, will be found described hereafter. In the voyage of the French frigate *Venus*, commanded by Du Petit Thouars, who was on the coast at the same time with Sir Edward Belcher, we find some information; and to M. Tessan, his hydrographical engineer, we owe some of the graphic information we possess. By Captain (afterwards

Rear-Admiral) Beechey, who was here in H.M.S. *Blossom*, the nautical world is informed of the exact nature of some of the islands and ports near the Gulf of California.

For the remainder of the coast, the Spanish charts of the Madrid Hydrographic Office furnish the details. In 1790 the Spanish Government despatched an expedition, under Don Alexandro Malespina, for the exploration of these shores, a task which we must suppose was completely performed; but the publication of his journal, which was looked for by the learned of Europe at that period, was frustrated by Malespina, a little time after his return to Cadiz, being arrested by order of government, and thrown into the prison of Buen Retiro, and afterwards transferred to one of the strong castles of Coruna. In this captivity El Padro Gil, a man of great learning and merit, also shared, and all papers and drawings belonging to, and collected by, the expedition, were seized and suppressed by the government. Of the cause of this little is known. The disturbed state of Spain, in reference to her overgrown and ill-attached colonies, might have led to suspicions against Malespina when in the country. Suffice it to say, that the charts, resulting from the survey, were subsequently published, as drawn up by Don Felipe Bauzá, F.R.S., from his observations while accompanying the expedition.

CLIMATE.—The following outline of the climate, weather, &c., by Commodore C. B. Hamilton, will be found useful.

The West Coast of Mexico is considered highly dangerous in the bad season, namely, from June to 5th of November, and all the vessels obliged to remain in the neighbourhood lie up either in the secure harbour of Guaymas or at Pichilique, in the bay of La Paz, both in the Gulf of California.

The hurricanes that occasionally visit this coast are so much dreaded, that in the months of July, August, September, and October, the ports are deserted, and trade ceases.

I believe the *Frolic* is the first vessel of any nation, whether man-of-war or merchant ship, that ever remained the whole bad season on the coast, and that off the two most dangerous ports, namely, San Blas and Mazatlan. I shall, therefore, give all the information I can relative to the bad season.

The hurricane so much dreaded on this coast is called the Cordonazo de San Francisco, a name given by the Spaniards, on account of the hurricane prevailing about the time of San Francisco's day, the 4th of October; the word *cordonsazo* signifying a heavy lash with a rope or whip; but, from my own experience, and all I can learn, these cordonazos may be expected any time from the middle of June to the 5th of November. The worst ones that have been experienced of late years have occurred on the 1st of November, although the weather usually clears up about the 20th of October, and sometimes even sooner; and as soon as the weather does begin to clear up, a ship may, with common precautions, venture into the anchorages again, for

this reason, the weather will give ample warning of a coming hurricane; whereas, in the previous four months, before the weather has cleared up, the circumstance that adds to the dangers of this coast is, that owing to the threatening appearance of the sky every evening, and the violent thunder storms and squalls at night, accompanied by heavy rain and lightning, the wind veering about, you are at first led to believe that the hurricane is coming every night, and latterly you see it is utterly hopeless to foresee the coming of it, as every night appearances were as bad as they could be; the barometer here being of little or no use, and a tremendous sea occasionally setting in. Thus the remaining off this coast during the hurricane season will cause great anxiety.

The squalls and gales usually commence about S.E., and quickly fly round to the southward and S.W.; you have generally time to get to sea when it commences at S.E.; but, as I have before shown, you must go to sea every night, if you can, if you would be free from the dangers of the cordonazos coming on. But a tremendous swell frequently sets in whilst the weather is in this threatening state, and the wind still light, which makes it impossible to get out. Moreover, if our boats happened to be out, and on shore when the swell came, it was impossible to hoist them in, and for this reason we have frequently been obliged to send our boats from the ship, with their crews, to be hauled up on shore, and remain there until the swell went down, that I might be ready to slip and go to sea.

It appears that the cordonazos come on an average once in 6 or 8 years, and we experienced none during our stay, although we had a gale on the night of the 21st of September. I was fortunately under weigh, and had plenty of room when it came on, having stood out to sea on the evening of the 19th, on account of the weather being bad, and fearing the full of the moon on the 20th.

It commenced about 9^h 20^m p.m. from the S.E., flying round to S.W., heavy rain, thunder, and lightning, with a very heavy sea, reducing us to close-reefed main-topsail, and fore-staysail, washing away a boat, and obliging us to batten down. The squalls come on very suddenly, the prevailing winds being in the bad season S.E. to S. and S.W., and the heavy swell usually before and after the full and change of the moon. The swell is such as is seen in the Bay of Biscay in a heavy gale, and, unfortunately, usually sets into the bays before the wind comes.

I therefore think, that a ship caught at anchor off San Blas, or Mazatlan, by a cordonazo, would have small chance of escape, especially off the former, as she would either go on shore or go down at her anchors; to slip and stand out the instant it commences from S.E. is her best course.

The range of the thermometer for June was 77° to 86°; July, 80° to 87°; August, 81° to 89°; September, 83° to 92°; October, 83° to 90°. The barometer appeared to be of little service, usually remaining 30 inches;

North Pacific.

seldom varying above a tenth, except during a heavy squall, when it rose considerably.

After the 4th of November the coasting and other vessels again make their appearance on the West coast of Mexico.

San Blas is very sickly during the bad season. Guaymas is healthy, although the thermometer stands there at the astonishing height of 106° in July, August, and September; and, owing to the extreme dryness of the atmosphere, ships receive much injury by the wood opening. Furniture, apparently well seasoned, there cracks and falls to pieces.

On this coast there are some immense fish, of the ray species. I caught two of them, and with difficulty hoisted one on board; it measured 19 feet in breadth across the back, the mouth was 3 feet 5 inches wide, and the flesh was 3 feet 6 inches in depth in the centre. I had no means of ascertaining the weight, but found I could not lift it with the yard tackles and 60 men, it requiring 130 men with the heaviest purchases in the ship to hoist it in. These fish are common on the West coast of Mexico and Gulf of California, where they are more dreaded by the pearl divers than sharks or any other fish.

Of the eastern part of the Gulf of Tehuantepec we know very little more than is shown in the chart from Malaspina's survey. The country is all volcanic inland, and, from the proximity of the mountains to the sea, there is no stream of sufficient strength to penetrate across the beach.

The GULF of TEHUANTEPEC, an inexpressive term, is given to the slender bay which extends for about 180 miles westward from the frontier of Guatemala, and is derived from the unimportant town which stands a few miles inland at its head.

The American Isthmus is about 120 miles in breadth from the Gulf of Campeche on the Atlantic side, and has received much attention from its supposed fitness for an inter-oceanic canal, as the country seems to be a remarkable depression of the Mexican plain.

Surveys were made of the Isthmus by General Don Juan de Orbegoso and Don Tadeo Ortiz in 1825, and Don José Garay and Signor Gaetano Moro in 1842-43, for the same purpose, of forming a communication between the Pacific and the Bay of Campeché, by means of a canal and the rivers falling into the lagoon of Tehuantepec, and the River Goazacoalcos, which runs into the Gulf of Campeché.

These surveys were not satisfactory, and it was accurately measured with the view of establishing a railway, by a scientific commission under General J. G. Barnard, U.S. Engineers, in 1850-1, by which its unfitness for a canal was demonstrated.

The whole shore of Tehuantepec is subject to the visitation of terrific hurricanes (which take their name from the isthmus), sweeping with resistless

fury along this inhospitable coast, which does not afford a harbour of refuge even for the smallest class of seagoing vessels.

Since the end of the sixteenth century Tehuantepec has been but very little frequented; the sea retires daily from its shores, and the anchorage deteriorates every year. The sand brought by the Chimalapa increases the height and extent of the sandy bars lying at the exit of the channel from the first lagoon into the second, and from this into the sea.

Between the base of the Cordillera and the ocean is a place which separates them from the lagoons, which, like an immense bay, communicates with the Pacific.

This *llano*, or plain, consists of a shifting soil, formed by the detritus of the slate composing the adjacent hills, a species of rock, which appears from time to time in crossing it towards the lakes, and even on the coasts, where it forms the islands and capes.

From the Cordillera to the lagoons the plain occupies a space of about 6 leagues. Those of the lagoons most inland may be about 4 leagues broad; and from its mouth, called the *Barra de Santa Teresa*, to the point where the two discharge themselves into the ocean, called the *Boca Barra*, may be 3 leagues. This second bay, or inner lagoon, extends to the westward in the form of a marshy lake, to the extent of 9 leagues, under the name of *Tilema*; and to the East, to the *Barra de Tenola (Tonala)*, to about 30 leagues.

There is but little depth in either of these; that outside has not more than 14 feet in the centre, in the line of the canoe navigation. The sandy tongue of land dividing the interior lagoon of the Tilema Marsh and that dividing this from the ocean, is formed by the waters brought down by the rivers coming from the Sierra Madre, particularly the Chicapa and the Juchitan.

Boca Barra, as above said, is the outlet of the extensive lakes which lie just within the line of sandy beach at the head of the Gulf of Tehuantepec, lat. about $16^{\circ} 12'$, long. $94^{\circ} 45'$, and, according to Mr. Trastour's survey, extend for 12 miles to the eastward, and for 22 miles to the westward of this entrance, varying from 3 to 11 miles in breadth. The Boca Barra is 500 ft. wide, with a least depth of 7 to 10 feet, but the current sets out of it with great velocity. Mr. Trastour, on Nov. 9th, 1850, at $11\frac{1}{2}^h$, found it to run out at the rate of $7\frac{1}{2}$ miles an hour.

VENTOSA BAY.—The Bay of La Ventosa, the harbour of Tehuantepec, is in lat. $16^{\circ} 11' N.$ and long. $95^{\circ} 8' W.$

Its S.W. limit is formed by the *Cerro Morro*, an isolated rock of an oblong shape, rounded at the summit, about 150 feet high and 2,600 in circumference; and a little more to the South by a pointed rock, separated from the former by an interval filled in with sand, and forming an angular projection into the sea called the *Morro Point*. This point is the eastern extre-

mity of a line of rocky hills which forms the coast for a mile to the westward, and is the termination of a spur from the Cordillera of Oaxaca.

To the northward of the Cerro Morro is the sandy beach, which trends first to the northward and then eastward, the seaward limits of an extensive plain, scarcely broken by the isolated hillocks of Huazoatlan. This beach is cut by sandy and shallow lagoons, having several outlets into the sea, and by the bed of the Tehuantepec River. At the time of the periodical overflowing this current flows over a low country before reaching the ocean, which it does by its mouth, a mile to the N.N.E. of the Morro.

It appears to have good holding ground, the depth being 6 to 9 fathoms, sandy clay bottom. The greatest difference in the level of the water observed was $6\frac{1}{2}$ feet. Ships ride sheltered under the Morro.

The N.N.E. wind commences in the middle of October, and ceases early in April. It is at its height, and blows without interruption in November, but after this it is not so regular, and gradually ceases altogether.

If the summits of the mountains of Guichicovi and San Miguel Chimalapa, about 45 miles distant to the North and N.E., but visible from sea, are hidden by slate-coloured vapour at sundown, the northers will blow next day. If these mists are seen at the former hour on the southern horizon, the S.S.W. wind will blow on the following day.

The environs were carefully surveyed, under the direction of Major Barnard, in December, 1850, by Mr. P. E. Trastour, C.E., as a terminus for the Tehuantepec Railway, which was proposed to cross the isthmus from the upper course of the Goatzacoalcos River at Minatitlan. This river falls into the Gulf of Mexico, and the railway was proposed to terminate on the Pacific to the north-eastward of the Morro, from which a pier was proposed to be run out for one-sixth of a mile into $6\frac{1}{2}$ fathoms.

Salina Cruz Bay lies to the westward of the hills extending from the Morro of La Ventosa. From the termination of that group of high lands the sandy beach of Salina Cruz trends to W. by N. for about $1\frac{1}{2}$ mile, and bending to the southward terminates at Salina Cruz Point, a rocky projection off which are several clusters of rocks, above and under water, to the extent of a cable's length, but the water is deep, 8 and 9 fathoms, just outside of them. In the bay the depth increases from 4 fathoms near the shore to 8 and 10 fathoms at 3 cables' lengths from the sandy beach. At a quarter of a mile North of the point, at the foot of the high ground, is a spring.

Salina del Marques lies to the westward of Salina Cruz, and is similarly formed, about $2\frac{1}{2}$ miles in extent, with lagoons at the back of the strand.

The town of TEHUANTEPEC is about 11 miles in direct distance northward from the beach of these bays. It has a population of about 13,000, and has several churches and a modern college.

The coast beyond this is very imperfectly represented, and the names of places are not recognizable on Bauza's chart. We have the following

accounts of two landing-places between Salinas and Guatulco, from the Nautical Magazine, as related by Captain Peter Masters.

The Bay of Bamba does not appear on the chart. The following description is by Captain Masters:—*Punta de Zipegua* is in lat. $16^{\circ} 1' N.$, long. $95^{\circ} 28' 30'' W.$ (?) From this point to the Morro de Ystapa the coast runs about W.N.W. by compass. Between these points are several bluff headlands. They do not project far out from the general line of coast, and afford no shelter. *Punta de Zipegua* forms the eastern part of what is called the Bay of Bamba, and is a very remarkable headland. From the westward it shows itself with a bold dark cliff to the sea, about 400 feet high. It projects out from the western line of coast nearly a mile, and forms a kind of double head. A short distance within the outer bluff is a peaked hill, with the appearance of a light-coloured sandstone. It is quite bare of vegetation. Further inland, between 1 and 2 miles, the ground rises higher in small hummocks. A few of them are quite bare, and others have a small quantity of stunted trees and bushes scattered over them. The head which forms the West side of the Bay of Bamba is not so high, nor does it rise so suddenly from the sea as *Punta de Zipegua*. It is also covered with bushes. The eastern side of *Punta de Zipegua* is covered with bushes and stunted trees; the sand only showing through the soil in very few places. When abreast of it, and off shore from 2 to 8 miles, the current was running to windward, W.S.W., from $2\frac{1}{2}$ to 3 miles per hour. About N.E., by compass, from the *Punta de Zipegua*, and distant from 4 to 5 miles, is a high reef of rocks, called *Piedra de Zipegua*, or *Machaguista*, in the chart, Island of Eschevan. Its greatest elevation is from 60 to 70 feet; its length is about a third of a mile, running in an E.S.E. and W.N.W. direction. It is said there are no dangers near it but what can be seen. Between it and the main, from which it is about 4 miles distant, in a N.W. direction, is good anchorage; the best is close to the reef. The pearl oysters are plentiful near this reef; they are caught by the divers in the rainy season. The general line of coast from *Punta de Zipegua* toward Tehuantepec runs about N.E. by N., easterly.

The beach, or *Playa de Bamba*, is about 5 miles long, and must be very bad to land on with a fresh sea-breeze. There was more surf on it when we landed than was very agreeable. The boat was half filled, although the wind was blowing along the coast.

The Morro Ayuca, or *Ayuta, de Santiago de Ystapa*, according to Masters. Sir Edward Belcher places it in lat. $15^{\circ} 51' 56'' N.$, long. $95^{\circ} 43' 56'' W.$, considerably to the southward of the Spanish chart. It is a bold cliffy point, surrounded by a reef, which has 3 and 4 fathoms close to it, and extending on the northern side to about $1\frac{1}{2}$ cable's length, some of the rocks being always visible. The bay, about $1\frac{1}{2}$ mile in extent, has a low sandy shore,

and vessels may anchor in 6 or 7 fathoms, fine sand, at three-quarters of a mile off, but only with northerly winds.

Near the Morro is the entrance of the small river of Ayuta, the stream that runs by Haumilulu (hereafter alluded to) and Ystapa. There is a bar runs across the entrance to it. The canoes land on the beach in preference to going over it, as this is attended with danger.

A few miles to the westward is the *Morro de la Laguna*, near which is a large lake, from which the headland takes its name.

The Bay of Rosario.—This name is not on the chart, but the following description, and directions for it are by Captain Masters:—

The West side of the Bay of Rosario is formed by the Morro de las Salinas de Rosario, and is in lat. $15^{\circ} 50' 25''$ N., long. $96^{\circ} 2'$ W., by four sets of lunars taken East and West of the moon. It projects about a mile beyond the line of coast. On the western side is a beach 4 or 5 miles in length to the next head. When abreast of Morro de las Salinas it appears like an island with two large rocks abreast of its eastern and western part; but the whole is connected to the main. What appears to be the eastern rock, is a broken rocky head, about 160 feet high. The western is about half the elevation. Both these heads terminate with a broken cliff; the tops of them are bare, and of greyish colour; the lower part is quite black, caused by the sea washing against them. Between these heads is a small sandy bay, which is at the foot of the Morro, and rises gradually from the beach to the top of the hill, and is about 180 to 200 feet high. It has a few straggling bushes on it, but its general appearance is very barren. The beach of Rosario is 10 miles long from Morro de las Salinas to Morro de la Laguna Grande, which is its eastern extremity. About half the distance between the Morros is a rock on the beach, about 40 feet high, and nearly the same diameter; at spring tides the water flows round it.

During the time of our lying in the Bay of Rosario, which was from the 12th of February to the 1st of April, we had three smart northers. These came on at the full and change of the moon. At this time the surf runs very heavy on the beach. Our boat was capsized several times whilst we lay here, in landing and coming off. At times the sea broke very heavily in all parts of the bay, that is, on the beach. I was caught on shore, a few days after arriving here, during the first norther, which came on suddenly with a parching hot wind. A cross, confused sea hove in from the South and N.E. The wind must have blown strong out in the gulf, from the same direction, and though it blew very heavily for three days, with the wind at times to the westward of North, the sea kept up until some time after the norther had ceased blowing. This is not generally the case, for a strong norther (and in particular if it veers to N.N.W.) beats the sea down, at which time landing is attended with little or no risk, which was the case when we had the last two northers. I was informed (and judging from appearances I think

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correctly) that very often when the wind is North or N.N.W., close in shore, it is N.E. in the offing, which makes it impossible to land on the coast. I remarked whilst lying here, at the full and change of the moon, when no norther was blowing, that although the surf ran so high that no boat could land, the vessel lay without any motion. We were moored less than 300 fathoms from the shore. The surf appeared not to be caused by a swell rolling in, and agitating the sea at the surface, but to rise from below, and without any apparent cause, as we had light winds and fine weather the most of the time we lay here. On another occasion I was caught on shore with a boat's crew for three days. In attempting to get off to the ship, the boat was capized and stove. It was then, and had been for a week previous, nearly a calm. The heavy ground swell invariably hove in from the S.S.W. We fortunately escaped from this beach without losing any of our people, which was more than I expected, having had three laid up at different times, who were saved from being drowned by a mere chance.

In addition to what has already been said about this part of the coast, it can be known by the low land at the back of the beach of Rosario. This runs in from 1 to 2½ leagues before there is much rise in it, and is thickly covered with trees. From North to N.W. of Morro de las Salinas, nearly 2 leagues from the shore, the rising ground is formed by a number of small barren hillocks. From our anchorage where we loaded at, the following bearings were taken, lying in 2½ fathoms water, sandy bottom. There are two larger patches of a whitish appearance, the farthest range of the Cordilleras, the eastern is also the lowest, and bore N. 59½° W. The appearance cannot be seen, unless from a little to the westward of Morro de las Salinas. This has every appearance of being a waterfall, and rises from the other patch in a N.W. direction at about an angle of 45°. It issues from a small valley in the Cerro del Chonga. The highest point of this range has but a small elevation above it, and is covered with trees. The waterfall inclines towards the South, and can be seen for several hundred feet descending before it is lost sight of amidst the forest below. Cerro de Zadan bore N. 89° W., and the extreme bluff of Morro de las Salinas, S. 36° W., 3½ miles. The eastern point well within the bearings, and Punta de la Laguna Grande, N. 71° E. 6 to 7 miles, and rock on the beach (already mentioned as 40 feet high), N. 65° E., and the galena or shed, under which the cargo was piled, N. 26° W. half a mile; bearings by compass.

At the western part of the bay are four palm trees close to the beach. The distance from the Morro de las Salinas is about half a mile, and between these trees and the Morro is a larger cluster of palms. Between these two clusters is at all times the best place to land, as a boat can beach here with comparative safety, when at every other part of the bay the sea runs very heavy. At the neaps we found the place quite smooth, with the exception

of a sea heaving in at about every 10 or 15 minutes ; but it causes no risk to a boat provided she is kept end on.

At the south-western part of the beach, and where a small pathway leads to cross the Morro de Salinas, close to the sea-side, in the cliff of a rock, is a small spring of excellent water. We always found it clear and cool, even at noon ; my consignee said we could fill the ship's stock of water from it with dispatch, but I soon found out that he knew nothing about it. The quantity that could be filled in a day did not exceed 30 gallons, and after having landed all our water-casks we had to re-ship them, through a great deal of surf, and land them at the galena abreast the ship. We filled our water at a well about a mile from the beach, but the supply was very limited ; it being the only well that had water in it up to the day of our sailing. we did not complete our stock.

A captain of a ship should trust to no promises when he comes here, either with regard to supplies or anything else, no matter by whom made ; and, as water and fuel are indispensable articles, the filling the one, and cutting the other, should be immediately commenced on their arrival by some of the crew. It is useless to employ Indians to work for the ship (that is, on shore), the greatest part of them will neither be led nor driven. On board they answer better (that is, a few of them) to haul the wood about in the hold. I found the promises of Indians, and, as they called themselves, "*gente decente y civilizado*," on a par.

From the Bay of Rosario to the Island of Tangolatangola there are several small headlands, which do not project much beyond the general line of coast, with the exception of Morro de las Salinas de Rosario. Most of them have a steep cliff facing the sea, with fine sandy beaches between them ; at the back of which are scattered a few small trees and bushes, the land rising in very irregular shaped hills toward the Cordilleras. Abreast of the beaches, between the heads, the anchorage is quite clear, and when in from 9 to 12 fathoms water the distance off shore is about a mile, with sandy bottom.

The *Island of Tangolatangola* is not shown on the charts. It is, however, thus mentioned by Dampier.

"At the small high island of Tangola there is good anchorage. The island is indifferently well furnished with wood and water, and lies about a league from the shore. The main against the island is pretty high champion savannah land, by the sea ; but 2 or 3 leagues within the land it is higher, and very woody."

Capt. Masters describes it thus :—"The Island Tangolatangola is E.N.E. 3 miles from Guatulco, and is separated from the main by a channel a quarter of a mile wide. This makes from the westward as a part of the main land ; the outer part of it is quite bluff, or rather a cliff of a brownish stone, the strata of which is horizontal, and has the same geological appearance as the land on the main nearest it to the N.E., and of the same height,

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PORT GUATULCO.

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namely, about 150 feet. Within the island, and round the western side, is the entrance of the Bay of Tangolatangola; it runs in about N.E. 2 miles. At the bottom of the bay is a fine sandy beach; the anchorage is said to be very good in it, but not equal to Guatulco; its entrance is more than a mile across, and continues nearly the same to the bottom."

The *River Capalita*, both according to Dampier and Malaspina's chart, must fall into the sea hereabouts. Dampier says that it is rapid and deep near its mouth.

PORT GUATULCO lies next along the coast, and is a very secure harbour. According to Sir Edward Belcher's survey of it in 1838, some islets that lie off its mouth are in lat. $15^{\circ} 44' 25''$, and long. $96^{\circ} 10' W$. Dampier's clear and graphic account of it is as follows:—"Guatulco is one of the best ports in all this kingdom of Mexico. Near a mile from the mouth of the harbour, on the East side, there is a little island close by the shore; and on the West side, half a mile from the mouth of the harbour, there is a great hollow rock, which, by the continual working of the sea in and out, makes a great noise, which may be heard a great way. Every surge that comes in forceth the water out of a little hole on its top, as out of a pipe, from whence it flies out just like the blowing of a whale; to which the Spaniards also liken it. They call this rock and spout 'the buffadore' (*bufadero*, Spanish, a roarer), upon what account I know not. Even in the calmest seasons the sea beats in them, making the water spout at the hole, so that this is always a good mark to find the harbour by.* This is also described by Mr. Masters.

"The harbour runs in N.W., but the West side of the harbour is best to ride in for small ships, for there you may ride land-locked, whereas anywhere else you are open to the S.W. winds, which often blow here. There is good clean ground anywhere, and good gradual soundings from 16 to 6 fathoms; it is bounded by a smooth, sandy shore, very good to land at, and at the bottom of the harbour there is a fine brook of fresh water running into the sea. Here formerly stood a small Spanish town, or village, which was taken by Sir Francis Drake; but now there is nothing remaining of it

* This description will also exactly apply to another of these singular phenomena, the *Souffleur* (French, blower), at the South point of the Mauritius. Here the water is driven up with enormous force to the height of 120 to 140 feet above the waves, and may be heard a long distance. They are also seen too, at times, around the bases of icebergs, and there was one, the Devil's Trumpet, on the coast of Cornwall. Other instances, less striking, might be adduced of these singularities, which are well worthy of a seaman's attention, showing, as they do, the power the waves exert, which, to raise such a column of water as above mentioned, must be from 3 to 5 tons per square foot.

besides a little chapel standing among the trees, about 200 paces from the sea.*

The following remarks, by Captain Masters, will complete the description ; —Santa Cruz, Port of Aguatulco (*Guatulco*), is very difficult to make ; it is situated in a small bay about half a mile wide at its entrance, and runs in to the northward upwards of one mile and a half. At the bottom of the bay is a sandy beach ; on its eastern part two huts are built, which cannot be seen unless close in-shore. E.S.E. three-quarters of a mile from the eastern point which forms the bay, is the *Piedra Blanca*. This is a reef of rocks extending East and West about a quarter of a mile. The western part of the reef is nearly 40 feet high ; for about one-third of its length it is of the same elevation ; the remaining two-thirds to the eastward is low, in places level with the water. When abreast of it and off shore a few miles, it appears to be a part of the coast. Although it is called *Piedra Blanca*, it is a dark irregular shaped reef of rocks.

The anchorage in Guatulco is said to be good. It is well sheltered from all winds, except between East and S.E. by S. ; but, as the strongest winds blow from the northward, except in the rainy season, it may be considered a very safe port. It is the only place that can be considered a harbour to the eastward of Acapulco, and even in the rainy season, I was informed that a vessel might lay there in perfect safety. The depth of water in the bay is from 7 to 9 fathoms, with a clear bottom.

When about 5 miles off the shore from the Bufadero, the western extreme point of land has a broken rocky appearance, and is not so high as the land adjoining. When about two leagues off shore from the Bufadero, another cape further to the westward can be seen. Its extreme point is rather low, but rises gradually inland to a moderate elevation.

To the westward of Santa Cruz are two bluff heads, which, when abreast of them, might be taken for islands. The first is about 3 miles from the port, the other is 2 miles further to the westward, and has a white sandy beach, from which to the Bufadero the coast is rocky. The land which crowns this part of the coast is covered with stunted trees and brushwood. N. $8\frac{1}{2}^{\circ}$ W. (by compass) between 4 and 5 leagues, is the *Cerro Zadan*. Its top is bell-shaped, and it has a ridge on its N.E. side, connecting it with the higher range of the Cordilleras. The *Cerro Zadan* is elevated above the sea rather more than 6,000 feet. The mountains further inland a few leagues cannot be much short of 10,000 feet high, as they can be seen over the *Cerro Zadan*.

* Guatulco seems to have been an unfortunate place during the buccaneering expeditions against the Spaniards, for Sir Francis Drake sacked the place in 1574, and it was burnt in 1587 by Sir Thomas Cavendish, among other places. The reader will find many notices of these and similar incidents in Admiral Burney's collection.

The Port of Guatulco is so bad to make that vessels have been upwards of a fortnight in searching for it. It was by the greatest chance possible we had not passed it, although we were not a mile and a half from the shore. The two huts which were on the beach can scarcely be distinguished from the trees near which they are built.

The coast beyond Guatulco trends a little to the South of West, for 20 or 30 leagues. At about a league West of Guatulco is a small green island called *Sacrificios*, about half a mile long, and half a mile off the land. There appears to be a fine bay to the West of the island, but it is full of rocks. The best anchorage is between the island and the main, where the depth is about 5 or 6 fathoms, sheltered from easterly winds. High water at 3^h 15^m. The tide runs strongly, rising and falling 5 or 6 feet.

The land winds are here at North, and the sea breezes generally W.S.W., sometimes at S.W., with an easterly current.

Westward of *Sacrificios* the shore is all formed of sandy bays, the country tolerably high and wooded, with an enormous swell tumbling in upon the shore.

PUERTO ANGEL, or Port Angeles, a new port, open to the foreign and coasting trade, on February 1st, 1868, is 20 miles West of *Sacrificios* Island, according to Bauza's chart. We have no recent particulars of it, but the following from old Dampier may be useful. It is a broad, open bay, with two or three rocks on the West side. There is good anchorage all over the bay in 30, 20, or 12 fathoms water, but you must lie open to all winds, except the land winds, until you get into 12 or 13 fathoms; you will then be sheltered from the W.S.W., which are the common trade winds. The tide rises about 5 feet; the flood setting to the N.E., and the ebb to the S.W. The landing in the bay is bad, behind a few rocks; the swell is always very great. The land bounding the harbour is tolerably high, the earth sandy and yellow, in some places red. It is partly wooded, partly savannahs.

Eighteen miles westward of Port Angel is a small rocky island, half a mile off shore. The coast is all small hills and valleys, and a great sea falls upon the shore.

Near the *Alcatraz Rock* (in long. 97° 30' W., Malaspina), the land is moderately high and wooded; farther within land it is mountainous. Five or six miles to the West of the *Alcatraz* are seven or eight white cliffs by the sea, which are very remarkable, because there are none so white nor so close together on all the coast. There is a dangerous shoal lying S. by W. from these cliffs, 4 or 5 miles off at sea. Two leagues to the West of these cliffs there is a tolerably large river, which forms a small island at its mouth. The eastern channel is shallow and sandy, but the western channel is deep enough for canoes to enter.

Beyond what the chart affords, we have no information of the coast to the westward. Several lagoons are marked.

Cuacaul Point is about 62 miles beyond Alcatraz Island, and is higher than the sandy coast on either side of it. A shoal extends for 4 miles seaward of it, having as little as 10 feet on it. H.M.S. *Tartar* struck on this shoal, March 4th, 1863, and places it in lat. $16^{\circ} 11' N.$, long. $98^{\circ} 32' W.$ The vessel's draught was 18 feet, but the least water obtained was $3\frac{1}{2}$ fathoms — (Capt. G. H. Richards.)

Off Cuacaul Point, from 2 to 3 miles distant, there is anchorage in 8 or 10 fathoms, sheltered from the S.W. by the shoal.

The *River Dulce* is 12 miles N.W. of Cuacaul Point; the *Clio Rock* lies 3 miles off it, 3 miles from shore, with 6 fathoms around it.

ACAPULCO.

This celebrated seaport has sadly fallen from the high position it once held among the places of commercial importance in the world. It owed all its prosperity to the system pursued by the Spanish colonial policy, and, when that power became annihilated in the new world, Acapulco descended, not to its level as a harbour, for it is one of the finest in the world, but to that of the capability of the surrounding country in supporting it. This, as is well known, is very limited, and the foreign trade that it has across the Pacific is of very minor importance.

In addition to the changes in its external relations, it has some very serious drawbacks to any permanent prosperity. The climate is extremely hot, and pernicious to European constitutions. This is increased by the proximity of a marshy tract to the East of the town. During the dry season this marsh dries up, and occasions the death of great quantities of small fish, whose decay under a tropical sun produces no ordinary amount of pestilential vapours to be diffused, a fruitful source of the putrid bilious fevers so prevalent here and in the vicinity.

Being entirely surrounded with high mountains, the sun has intense power and the usual breezes are in a measure intercepted. To remedy this, an artificial cut was made through the chain of rocks which surrounded the town; this has caused a freer circulation of air.

It has been well surveyed, and the plan from the united observations of Sir Edward Belcher and M. de Tesson, the Hydrographical Engineer to the expedition of Admiral Du Petit Thouars, in the *Venus*, with later, will give a perfect idea of the port.

It consists principally of one extensive basin, in an angle of which, on the N.W. side, stands the town. At its head are some whitish rocks, the *Piedras Blancas*, useful as marks in entering. There are two entrances, formed by *Roqueta* or *Grifo Island*. That to the North of it is called the *Boca Chica* or Little Entrance, and is narrow. The principal entrance is between

the South point of *Grifo* (*Sicla Point*) and the S.E. point (*Bruja Point*) of the harbour, and is above $1\frac{1}{4}$ miles in width. It is quite clear.

Eastward from Bruja Point is *Port Marques*, extending $2\frac{1}{4}$ miles E.S.E. Its S.W. point is named *Diamante Point*. This bay, too, is quite clear.

Earthquakes are a great scourge to Acapulco, and must prevent its ever becoming a substantial town; at present it is poor and mean. Besides the earthquakes, the heaviest of which occur between March and June, the rainy season is also another great drawback, and is felt here severely. It commences about the middle or end of July, and continues until the end of October. Owing to the immediate vicinity of a very lofty chain overlooking the town (one of 2,790 feet), the fall is heavy and almost incessant. It has been asserted that, in 1837, the rain gauge frequently indicated 28 inches in 24 hours. During this period the inhabitants are compelled to use every precaution to keep their houses dry, particularly under foot; a neglect of this is supposed to produce fever. The heat during this period is excessively oppressive, especially in May, when the temperature seldom falls below 98°. Water then becomes scarce, and, towards the end of the dry season, the ponds run dry, and wells are their only resource.—(Sir E. Belcher.)

The entrance into Acapulco lies about midway between the East and West extremes of a high portion of the coast, which stands forward in a very prominent way to the southward of the rest of the coast; the centre part is the highest, probably about 3,000 feet above the sea.

Both ends run off to bluff points; the eastern one is called Point Bruja, and is distinguishable by its presenting a set of steep white cliffs; it is succeeded on the eastern side by a long line of white sandy beach, backed by a lower range of country, which reaches to the foot of the hills.

The entrance of the harbour, when bearing North, has Point Bruja on the East, and a small promontory on the West, not unlike each other, and both having white cliffs.

The entrance may also be distinguished by a remarkable white rock, the *Farallon del Obispo*, 148 feet high, which lies nearly abreast of the middle part of the white beach at the bottom of the Bay of Acapulco; this may be seen with ease at the distance of 3 or 4 leagues, when it bears on any point of the compass between N. $\frac{1}{4}$ W. and N.N.E. $\frac{1}{4}$ E. by compass; in other cases it is shut in, either by the land near Port Marques, or by the Island of Grifo, off the entrance.

Port Marques, an inlet $1\frac{1}{4}$ mile in depth, lies to the S.E. of Point Bruja; its entrance between that and *Diamante Point* to S.E. of it, is nearly a mile wide. It is not easily made out till within a couple of leagues. In the entrance the depths are 18 to 20 fathoms, the shores quite bold-to, and in the inner basin from 10 to 15 fathoms, but near its head, within the depth of 5 fathoms, is a sunken rock.

Grifo, or Roqueta Island, is nearly $1\frac{1}{4}$ mile West of Point Bruja, that

being the width of the Boca Grande. A *fixed light* is said to be shown from this island, which may be seen 5 miles off. At its N.E. end is a smaller island, 50 feet in height, called *El Morro*; and at a quarter of a mile East of this is a small rock, which is only 4 feet above high water. This should be looked after if you enter either by the Boca Chica or the Great Entrance. *Point Grifo*, which is three-quarters of a mile N. by E. from the Morro Rock, is the S.E. point of an inner bay, called *Santa Lucia Bay*, on the North side of which is the town of Acapulco. A *light* is said to be shown from the point when the steamers, in connection with the Panama Railway service, are due.

There are no dangers in Acapulco Harbour, except the *Serieuse Shoal*, of 2½ fathoms, close to the North side of the harbour, half a mile E.N.E. from the Castle of San Diego, and nearer the shore than any ship would think of going. There can be no difficulty in making out the situation of this harbour, when it is understood that its latitude is 16° 50' N., and that it is pointed out by a lofty promontory, which maintains its height and abruptness to the very sea, without any low land; this high land is covered with trees or shrubs, and everywhere presents a green surface, except where it meets the sea, and then its face is laid bare, and shows only naked white or gray cliffs of granite, not of a massy character, but splintered in all directions.

The anchorage is abreast of the town in the western corner of the bay, near two white rocks, to one of which a hawser may be made fast, and the ship canted to the sea breeze. There is a remarkable high land considerably to the eastward, and much further inland than the promontory of Acapulco, having a long tabular top, which rises considerably above the neighbouring peaks. But there is no difficulty in distinguishing this promontory, when coming along shore from the eastward, as it is the first high coast land which reaches to the sea, and terminating a line of low white beach. On the western side, the coast line is high, and offers such a variety of forms and heights, that it may not be easy to distinguish the high land of Acapulco, or rather a stranger might perhaps mistake some other part of the coast for it.

The paps of Coyuca are the marks generally pointed out as affording the means of distinguishing the land; they lie some leagues to the westward or W.N.W. of the promontory of Acapulco, and might be better described, I think, as a castle or fort-like mountain, than as paps. There is first a very abrupt precipice facing the West, with a surface somewhat tabular, but not quite level; the top being nearly equal, in horizontal length, to what the cliff is in abrupt height; then there is a nick or gully which is succeeded by a flat peak, not very unlike a pap. After this there is a long hog-backed ridge, with an irregular peaked termination at the eastern end. The land between this and Acapulco sinks considerably, and though it still remains a tolerable height, the promontory is always sufficiently conspicuous.

When its extreme South point bears about East, and indeed when it bears considerably to the northward of East, there is no high land to be seen beyond it to the eastward.

At the distance of 7 or 8 leagues the land about Point Bruja makes like an island.—(*Basil Hall.*)

Sir Edward Belcher says (January 12, 1838):—"We made the high paps of Coyuca, to the westward of Acapulco; but I cannot persuade myself that they are good landmarks for making the port. In the offing they may be useful if not obscured.

Acapulco may be approached from the southward or westward, by keeping the western cone open of the land, which will lead up to the Boca Chica entrance, or until Acapulco port is so close under the lee, that no further marks are necessary. There is not any hidden danger in the entrance to Acapulco. Keep a moderate distance from either shore; 5 fathoms will be found alongside all the rocks, and 25 to 30 in mid-channel. Round Point Grifo sharp, rather than stand over to San Lorenzo, as the wind, generally westerly, heads on that shore. If working, tack when the rocks on the South point of Tower Bay show in the gap.

The two best berths are off the rocks alluded to; that outside is preferable; but in either case let the outer rock bear W.S.W. or W.N.W., so that a hawser fast to the rock may keep your broadside to land or sea breezes, and prevent a foul anchor.

The Harbour of Acapulco has long been reckoned, for its size, one of the most complete in the world. It affords sheltered, land-locked anchorage of 16 fathoms and under, in a surface of one mile square; which, allowing for moorings, would, at half a cable's range, or one cable asunder, accommodate 100 sail of vessels, even of the line. The bottom is sandy at its surface, but clayey beneath, and holds well.

It would naturally be inferred that, surrounded on its North and East sides by mountains ranging from 2,000 to 2,700 feet, and by others of 300 to 500 feet on the West, the breeze would scarcely be felt, and the heat be intolerable. This is confined to the town limits. At our observatory (Captain Belcher's), and the port, San Carlos, we enjoyed a constant breeze.

In all harbours there may be objectionable berths, but in that of Acapulco, if care be taken to keep in the line of what I have designated "West Gap," or neck of the peninsula open of the South point of the town bay, both land and sea breezes will be felt in their full strength, and free from causes which would heat them before entering the port, the neck being but a few feet above the sea level.

Water of good quality was found at several points between the fort and Obispo Rock; but the two best streams are between the fort and San Lorenzo.

Captain G. H. Richards, R.N., the present hydrographer, surveyed a part of the coast to the westward, in H.M.S. *Hecate*, in 1863, and he has given the following:—In approaching from the westward the Paps of Coyuca are a good guide; they are two distinct conical summits, and the mountain is about 4,000 feet high; it lies N.W. by N. nearly 30 miles from Acapulco, and 20 from the coast. The land westward of Acapulco is high. At the distance of 10 or 12 miles from the coast two distinct ranges are seen; the nearer one about 2,500 feet high; and the more distant one, of which the Paps form a portion, over 4,000 feet. When the Paps of Coyuca bear N. by E. $\frac{1}{2}$ E., a red stripe, or land-slip will be seen on the coast right under them. A square table-topped mountain rises just westward of Acapulco, to between 2,000 and 3,000 feet. When within 8 or 10 miles of the port, Roqueta Island is seen, which has a high, yellow, cliffy coast, as also the point of the main land northward, forming the entrance of the Boca Chica.

Diamante Point, which appears as the eastern extreme of the land, shows as an island at the distance of 7 or 8 miles; the head of Port Marques, of which it forms the South point of entrance, being low. Making Acapulco, from the S.W. or southward, the entrance is remarkable, from the yellowish cliffs of Diamante Point, and Roqueta Island which may be seen at a considerable distance. The Paps of Coyuca are also seen, but the eastern peak appears cut off. There is also a white wooden tower on the summit of Roqueta Island, which is used for a lighthouse, and seen 6 or 7 miles off. The light is only exhibited when the Pacific Mail Steam Company's vessels are expected.

The coast to the West of Acapulco is low, and formed by what is called the beaches of Coyuca. The swell sets so strongly upon this long, shallow, sandy bay to the West, that it is impossible to get near it in a boat or canoe; yet it is good clean ground, and good anchorage a mile or two from the shore. The land near the sea is low, and moderately fertile, producing spreading palms and other trees, which grow in clumps all along this bay. The land-wind here is generally from the N.E., and the sea-breezes from S.W.

The Paps of Coyuca, serviceable as a mark for approaching Acapulco, have been before noticed. They are remarkable, and may be readily distinguished, as Capt. Belcher says, "when not obscured." According to the Spanish chart, they are in lat. $17^{\circ} 6' N.$, long. $100^{\circ} W.$

Having arrived at *Point Jequepa* (or Tequepa), the coast trends rather more northerly, and at about 20 leagues is the *Morro de Petatlan*, a high mountain, which may be known by the islands which surround it.

"The hill of Petatlan (Petatlan) is a round point stretching out into the sea, appearing at a distance like an island. A little to the West of this hill are several round rocks." Dampier anchored on the N.W. side of the

hill, passing inside of these rocks, between them and the round point, where he had 11 fathoms water.

Between this point and several white islands, is the small port of Siguantanejo, or Sihuantanejo.

PORT SIHUANTANEJO has been surveyed by Captain Kellett, R.N., 1847, and from his plan it would appear to be an excellent harbour, but open to the S.W. There is no hidden danger going in, and the entrance is sufficiently marked by the bold coast to require no directions. The position of the observations at the head of the port, Captain Kellett places in lat. $17^{\circ} 38' 3''$ N., long. $101^{\circ} 30' 52''$ W.

Dampier passed along this coast, and says—"About 2 leagues West from Petaplan is Chequetan (Sihuantanejo?). At $1\frac{1}{2}$ miles from the shore is a small bay, and within it is a very good harbour, where ships may careen; there is also a small river of fresh water, and sufficient wood."

He landed at a place he calls Estapa, a league to the West of Sihuantanejo and taking a mulatto woman for his guide, his companions plundered the unfortunate Acapulco carrier.

To the West of Estapa, Dampier says the land is high, and full of ragged hills; and West from these ragged hills the land makes many pleasant and fertile valleys among the mountains.

All this coast is lined with villages and salt-works (salines), worked by the inhabitants. The approach to the coast is clear, but there is no safe anchorage, and there is not a single important river. That of *Sacatula* or *Zacatula*, which comes from the Volcan de Jorullo, as also the *Rios Camuta* and *Coalcaman*, are not navigable. Captain G. H. Richards says that it must be a very small one, for nothing of the kind could be made out from the mast-head at the distance of $1\frac{1}{2}$ mile.

Mangrove Bluff, a low, but well-defined point, in lat. $17^{\circ} 54' 5''$ N., long. $102^{\circ} 12' 41''$ W., is the western extreme of a deep bay, at the head of which the *Canuta* or *Salt-pits* are marked in the old chart, and is near where the Sacatula River is said to be.

From Mangrove Bluff the coast trends W. by N. $\frac{1}{2}$ N., nearly straight, with no remarkable feature for a distance of 60 miles to *Lizard Point*, which is low and cliffy.

Soundings.—At the distance of 8 miles eastward of Lizard Point there are from 35 to 40 fathoms, at 3 miles from the shore, which continue until approaching Mangrove Bluff; and, singularly enough, at the distance of 3 miles to the westward of it, and scarcely 2 from the beach, there are 132 fathoms, mud bottom.

Immediately South of the bluff, and nearly 2 miles from it, there are only 14 fathoms, shingle bottom; and the same depth, or less, continues for 3 or 4 miles to the eastward, parallel with and at the same distance from the coast, when the water suddenly deepens.

North Pacific.

A high and very remarkable mountain rises over the East side of the Salt Pit Bay, and the isles *Blancos* shown on the chart are very conspicuous objects. They are three white islets or rocks, the easternmost being the largest, square, and something like a haystack in shape.

Tejupan Bluff is 26 miles W. by N. $\frac{1}{2}$ N. from Lizard Point, the coast between being generally steep, and rising somewhat abruptly to 2,000 feet.

At 10 miles eastward of Tejupan is the only remarkable intermediate point. Three white rocks lie off it, in an E.S.E. direction, and a sandy bight is formed to the westward. Inside them, there is a fertile-looking spot, with a village, and probably landing, and shelter for boats.

The bluff is bold and cliffy, with two small rocky islets off it. Anchorage in 16 fathoms was found 7 miles south-eastward of the head, a mile from the shore. The hills rise in successive ranges parallel with the coast to the westward, the nearer ones from 1,500 to 2,000 feet high, the more distant much higher.

The Paps of Tejupan, a mountain 5,860 feet high, with a double nipple summit, lie 21 miles E.N.E. from the bluff of the same name, and although remarkable in passing up or down the coast, would scarcely be so from seaward, in consequence of the back ranges rising to a greater elevation.

Colima Mountain, 12,000 feet high, and 15 miles inland, is visible from this part of the coast, and very remarkable when seen distinctly; but the haze, which generally hangs over the distant land, renders this seldom the case, and it therefore cannot be counted upon as a land mark. It is a saddle-shaped mountain. The two sharp conical summits, apparently near the same height, and the horizontal measurement between them from off Tejupan Bluff is 45 miles.

Black Head is 18 miles N.N.W. from Tejupan Bluff, the coast between being composed alternately of sandy beach and high cliff. Black Head is a cliffy peninsula, lat. $18^{\circ} 36' 18''$ N., long. $103^{\circ} 41' 51''$ W., which is connected to the shore by a sandy neck. A small white rock lies half a mile N.W. of the northern extreme of the peninsula, and a bay is formed to the northward of the rock, where there is anchorage in fine weather in 14 fathoms water, $1\frac{1}{2}$ mile off shore.

MANZANILLA was visited by Sir Edward Belcher in 1838, and by Capt. G. H. Richards in 1863. The bay (or harbour) is about 5 miles wide, and is divided into two bays on the North side by a *Punta de la Audiencia*. The bay to the East is Manzanilla, and that to the West Santiago, and in this is the best watering place.

The bay is small but safe, the anchorage is good, the water brackish. There are no houses; men and families living exposed under the trees; and had not the *Leonora* (an English bark, then at anchor) been there, it is probable that we should not have seen a soul.—*Sir E. Belcher*, 1838.

The port is well protected against the southerly winds prevalent during

the East side of the Salt
are very conspicuous ob-
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comes abruptly to 2,000 feet.

Remarkable intermediate point.
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Exposed under the trees; and
(the anchor) been there, it is pro-
posed. E. Belcher, 1838.

ely winds prevalent during

the rainy season; but, on account of a very considerable lake of stagnant
water in its immediate neighbourhood, it is very unhealthy during the sum-
mer. Infested by myriads of mosquitoes and sand flies, even in the dry
season, it is nearly impossible to reside there. It has been open to foreign
countries for several years, but has not been able to make much progress.
The port itself has not a single house, and the first adjacent town is Colima,
formerly the capital of the territory bearing the same name, now embodied
with the department of Michoacan.

Captain G. H. Richards gives the following account of it:—

The *White Islet*, or *Piedra Blanca* of Manzanilla, lies off the eastern extreme
of the sandy beach which runs in almost a straight line for 13 miles from
Cape Graham, at a mile from the shore. It is a quarter of a mile long and
300 feet high, wedge-shaped when seen from the westward, and remarkably
white, being the resort of numerous sea birds. This islet is the mark for
Manzanilla Bay, and may be seen from the westward immediately on round-
ing Navidad Head, a distance of nearly 20 miles; it then appears just
inside the extreme of the land. It can be seen easily from a vessel's deck
at a distance of 15 miles, when bearing from E. $\frac{1}{4}$ S., round by North to
W.N.W.

Manzanilla Bay is known by this white islet $2\frac{1}{2}$ miles westward of its West
point of entrance. A high rock lies close off this point; and another white
rock, resembling a sail, at a quarter of a mile off the eastern point. From
the westward they are both remarkable. Approaching Manzanilla from the
westward, the Vigia Grande, a remarkable cone-shaped hill, will also be seen
just inside the sail rock. It is 740 feet high, and rises immediately over the
anchorage. As neither the houses nor shipping can be seen from sea-
ward, this is a good mark to steer for, passing from $1\frac{1}{2}$ to 2 miles out-
side the White Islet, and the same distance from the West point of
entrance, when the Vigia Grande will bear E. $\frac{1}{4}$ N., and may be steered
for.

This course will lead more than a mile southward of or outside the Sisters,
a group of five rocks, the largest of which is 10 feet high. They lie in a di-
rect line between the West point of entrance and the Vigia Grande, distant
from the former $2\frac{1}{2}$ miles. A very remarkable table-topped mountain, 2,600
feet high, rises over the western point of the bay, and is an excellent guide
for the port. The anchorage is immediately under the Vigia Grande, about
one-third of a mile from the village, in 9 or 10 fathoms water; over mud and
good holding ground. Manzanilla (West end of village), lat. $19^{\circ} 3' 13''$ N.,
long. $104^{\circ} 17' 41''$ W.

The bay is safe with all winds except gales from West or S.W., which do
not occur between the months of November and June—the dry season, and
singularly enough, the least healthy; fevers and ague prevail, more or less,
at all times, but are more fatal during the dry season. It is not recom-

mended to lie here more than four or five days at a time, and to take an off-shore berth, where the sea breeze will reach.

Supplies.—Fresh beef and vegetables, as well as other necessities, can be obtained here. Fresh water should on no account be received on board, and it is desirable that the crews of vessels should land as seldom as possible, nor be exposed in boats when avoidable.

Water of tolerable quality may be got from a small brook across the bay, about N.W. from the anchorage. For the purpose of procuring it choose, if possible, a very calm day. Stow the casks to be filled in the long boat, or launch and anchor it near the brook at the back of the surf. Hire a canoe to land the casks, with some iron-bound hogsheads, which are to be rolled across the strand to the brook, and then filled, which done, haul them with a running line to the boat, and fill the casks.

The tide occurs every twenty-four hours, the flood in the morning and the ebb in the evening. It rises about 7 feet, and the current runs to the South. Good pearls, &c., may be had.

Manzanilla is about 20 or 30 leagues' distance from the city of Colima, the capital of the territory of that name. Except frequent earthquakes and goitres, with which the inhabitants are affected, there is nothing remarkable in the city, which contains about 30,000 inhabitants, wholly occupied in agriculture and commerce.—*Duflet de Mofras*.

At 8 leagues to the E.N.E. is the *Volcan de Colima*, before mentioned, the westernmost of the Mexican group. Its entire height is 12,003 feet; it is in activity, and sulphureous vapours, cinders, and stones are emitted; but it has not discharged any lava for a long period. The diameter of its crater is 500 feet, and its mouth is perpendicular. The flanks of the mountains are barren and cliffy. The sulphur on it is of a bad quality. At a league North of the volcano there is an extinct crater, which exceeds the former in elevation by 710 feet, and the height of which above the port is 12,713 feet. Its summit is covered with snow, and it may be seen at very great distances at sea, and offers, when the sky is clear, an excellent point of recognition for navigators approaching Manzanilla.

The valley in which Colima is situated seems to be formed of volcanic products and decomposed lava. The vegetation consists of palms, aloes, and superb orange trees. Above the usual level these tropical plants are replaced by forests of sombre pines.

From 2 miles beyond the West point of Manzanilla Bay to Cape Graham an almost straight sandy beach extends in a W. by N. direction for 13 miles the coast being from 15 to 20 feet high; the long lagoon lies immediately behind, and beyond again the land rises in distinct ranges to between 3,000 and 4,000 feet.

Between Navidad and Manzanilla, during the fine season, boats may gener-

rally land on the beach, and there is safe anchorage half a mile from the shore in 18 fathoms.

NAVIDAD BAY.—After rounding Navidad Head from the northward, at the distance of 2 miles, the white sandy beach of Navidad Bay will be seen, bearing E. by N., distant 7 miles. Cape Graham, the East point of the bay, 700 feet high, has a high peaked rock close off it, as well as a smaller one, which, however, do not show as detached from any position a vessel would be in. There is also a small rock, 6 feet above high water, which bears from the cape S.W., distant half a mile. At 2 miles off the white rock of Navidad there are 60 fathoms water, and steering for the anchorage it gradually shoals to 40 and 30 fathoms. Navidad Bay, North Beach, lat. $19^{\circ} 13' N.$, long. $104^{\circ} 41' 25'' W.$

As the bay is approached, Harbour Point, a very remarkable high white point, will be seen on the northern shore; immediately round and inside it is the anchorage, a very fair stopping place during the fine season, but it is not recommended for a sailing vessel at other times, as there is a difficulty in getting out with a S.W. wind. The best berth is in 7 fathoms water, sandy bottom, with Harbour Point bearing S.S.W. a quarter of a mile, and the same distance from the eastern shore of the bay. Sailing vessels may anchor farther out, with the point bearing West, in 10 and 11 fathoms, but there will be more swell.

A single house stands in the North hook of the bay, and a lagoon within a few yards of the beach, where the water is fresh, and the natives say good, but it is not recommended to use it unless a vessel is in distress. At the S.E. end of the bay is the N.W. end of a long lagoon which here opens into the sea; a strong stream runs out of it, and there is sufficient depth for boats at half tide. There is a small village here, and some supplies of fresh provisions may be obtained. The anchorage off this end of the bay is not recommended.

Navidad Head is 7 miles westward of Navidad Bay. It is a wedge-shaped summit, about 400 feet high, falling in shore to a low neck, and is remarkable when seen from any direction. On approaching it, within 3 or 4 miles, it is seen to be an island, separated from the main by a low rocky ledge, which the water rises over. Off the head are three remarkable rocks, extending in a S.W. direction; the centre one being white, with a smooth round top, covered with vegetation, and about 70 feet high. These rocks give the head some slight resemblance to Farralone Point, with the Frailes Rocks, when seen from the N.W.; but the peculiar shape of the Wedge Island would prevent the possibility of a mistake after the first glance.

The white rock of Navidad has been mistaken for the white islet of Manzanilla by strangers, and accidents have occurred in consequence, but this mistake could only have arisen in the absence of any chart. The Navidad Rock is small, the centre of three, and stands off a prominent headland.

The white islet of Manzanilla, 20 miles to the south-eastward, is very larger, remarkably white, and stands alone, a mile from shore, but, rather in a bight, cannot be seen projecting from any position a vessel be in. Besides the three high rocks off Navidad Head, there is a one, which occasionally breaks, and lies S.E. $\frac{1}{2}$ E. from the white rock, distant a short mile.

Tenacatita Bay is 5 miles wide from Navidad Head, its S.E. point *Brothers Point*, its N.W. extreme. The latter has a rather remarkable double hill rising immediately over it, which from the northward appears like an island. Off the point is a high, square, perpendicular rock, and smaller ones about it above water; there are also some off-lying dangers to be avoided.

Porpoise Rock, 7 feet high, lies $1\frac{1}{2}$ miles W. by S. from *Brothers Point*, and a breaking rock lies S.E. by S. $3\frac{1}{2}$ cables from the same point. The bay is spacious, and is more than 2 miles deep, and there is said to be good anchorage in its N.W. corner, well protected, with the wind from that quarter. It should, however, be entered with caution, as it has not been examined. A berth of 2 miles should be given to *Brothers Point*. One or two whales were observed in the N.W. part of the bay.

The *Frailies*, two needle-shaped rocks, from 80 to 100 feet high, lie north-westward of *Brothers Point*, and the same distance south-eastward of *Farralone Point*, which is low and projecting. They are at half a mile from the shore.

Flat Top Point is 8 miles north-westward of *Farralone Port*. On this point, the South extreme of *Perula Bay*, rises a remarkable flat-topped mountain, 1,100 feet high, which is very conspicuous from the north-westward.

PERULA BAY, a spacious and convenient anchorage, is 60 miles eastward of *Cape Corrientes*. It is easily recognised from any direction by two islands, which lie in the centre of it; the northernmost of which is *Passarera*, 130 feet high, is remarkable from its perpendicular white cliffs, which are seen from a long distance. *Perula Bay* (*Observation Cove*), lat. 31° N., long. $105^{\circ} 6' 33''$ W.

Colorado, the southern island, is rather low, and has a slightly conical appearance. The best anchorage is in the northern part of the bay. The entrance is between *Rivas Point*, the north-west extreme, and *Passarera Island*, and is a mile in breadth. The depth of water from the entrance is 18 fathoms.

Rivas Point is bold and cliffy, with some detached rocks a cable and a half off it, the outer one 30 feet high. From this rock a reef, 2 feet above water, and on which the sea always breaks, lies East, distant $1\frac{1}{2}$ cables. There is anchorage anywhere within a line between *Rivas Point* and *Passarera Island*, in from 10 to 14 fathoms water,

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most sheltered is with the high rock off Rivas Point, bearing S.W. by S.,
distant about half a mile, or midway between it and the sandy beach on the
eastern side of the bay, where there are 4 and 5 fathoms at a cable and a
half from the beach. Small vessels may anchor in the northern bight of the
bay, and be more out of the swell.

At the south-east end of the bay, nearly 4 miles from Rivas Point, is the
village of Chamela. Vessels wishing to anchor near it should enter between
Colorado Island and the small islands to the south-east of it. This channel
is two-thirds of a mile wide, and free from danger. Large vessels may an-
chor in 8 fathoms, with the South point of Colorado Island bearing S.W. by
W., and the village of Chamela just open of San Pedro Island, midway be-
tween the island and the shore of the bay. Small vessels may anchor in 4
fathoms inside Cocino Island, where they will be two-thirds of a mile from
the village. Inside this it shoals rapidly, and off the village there is only a
fathom of water.

From Passarera Island a bar extends to the opposite sandy point of the
bay, distant two-thirds of a mile. The least depth of water on it is 3
fathoms, so that vessels of greater draught cannot pass from the northern
anchorage to the southern part of the bay, but must go outside the
islands. The bottom is sandy, but good holding ground. During the
fine season, from November till June, the sea breeze from N.W. is regular
during the day, and the land wind at night, and the anchorage is perfectly
safe; but with S.W. or S.E. winds a heavy swell sets in every part of
the bay.

Supplies of fresh beef, pumpkins, and water-melons, may be had at the
village, by giving a day's notice; there is also good water from a stream
close to it. Dye-wood is exported, but of an inferior quality.

Immediately southward of the cape a sandy beach commences, the general
features inland being conical peaks. Soundings are obtained 4 miles South
of the cape, and at the distance of 3 miles from the shore, in from 45 to 55
fathoms, and whenever a sandy beach line is observed, 19 or 20 fathoms
water will generally be found within a mile of it, where vessels may anchor
if necessary; but the coast is not considered safe between June and the end
of November, during which time S.E. and S.W. gales are prevalent, bring-
ing in a heavy sea.

CAPE CORRIENTES, a bold and lofty headland, with rather a flat sum-
mit, rises to between 2,000 and 3,000 feet. From the northward and west-
ward it is not remarkable, but from the southward it is bold and projecting
There are no dangers off it, and soundings were not obtained with 106 fa-
thoms, at 4 miles West of it. Cape Corrientes, extreme, lat. $20^{\circ} 25' N.$,
long. $105^{\circ} 39' 21'' W.$ *

* RICHMOND ROCKS, laid down in the charts at 8 miles W.S.W., or 13 miles W. $\frac{3}{4}$ S.

Between Cape Corrientes and Manzanilla there are the three little frequented anchorages of *Guatlan*, *Navidad*, and *Tamatlan*.

The cape is a bold and well-characterised promontory, jutting far into the sea, with a tolerably straight sky line, broken here and there by ravines and small peaks. It is everywhere clad with underwood to the top, and has the appearance of being a safe, bold shore. Sandy beaches were noticed in different places, but in general the cliffs appear to be washed by the sea.

Beyond Cape Corrientes, which all ships from the South should make going to San Blas, is the great *Bay of Ameca* and the *Valle de Banderas*, or 15 leagues in extent, where foreign ships sometimes take in the Brazilian wood, with which the country abounds.

Point Mita, a narrow projecting point, is the N.W. point of Valle de Banderas Bay, and is 24 miles N.N.E. There are some rocks off Point Mita, the eastward of which there is anchorage in the northern part of the bay 8 fathoms.

In front, and at 4 miles S.S.W. of Point Mita lie, nearly on the same parallel, the three small islands *Las Marietas*, and a fourth, to the West called *La Corvetana*. This group being only a degree distant from that of the Tres Marias, presently described, should be carefully made, in order to prevent any error.

The Marietas are surrounded by numerous rocks, the westernmost is 10 miles distant, and is rocky on the western side.

La Corvetana is a bare rock, 25 feet high, in lat. $20^{\circ} 44' N.$, long. $105^{\circ} 46' W.$ It is of small extent, not larger than a ship's hull, and when seen from the southward appears in three summits. The water seems to be deep around it, and it lies 20 miles N.W. $\frac{1}{2}$ N. from Cape Corrientes.

The coast beyond Point Mita retires a little, trending first 8 miles to the eastward, and then N. $\frac{1}{2}$ E. for 34 miles to the entrance of the river Cuicatlan. In the interval are met with, after *Point Tecuaitan*, the anchorages of *Chacala* and *Matanchel*, to the South of the small *Cape Los Custodios*, which marks the South entrance to San Blas.

The **TRES MARIAS** lie 70 miles to the north-westward of Cape Corrientes. They were discovered by Mendoza in 1532, and often served in after years, as a refuge to pirates and the buccaneers who scoured these coasts. Dampier was here in 1686, and he says,—“I had been for a long time suffering of a dropsy, a distemper whereof, as I said before, many of our men died; so here I was laid and covered all but my head in the hot sand. I endured it near half an hour, and then was taken out and laid to sweat in a tent. I did sweat exceedingly while I was in the sand, and I do believe it did

from the cape, from the report of Captain S. Richmond, 1855, are believed not to exist. The natives and others employed in the coasting trade for many years assert there is no such rock.

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sand bath.

The group properly consists of four islands. The southernmost is *Cleopha*;
it is 3 miles long E. and W., and 2 miles broad. It has some rocks off its
N.E. point, and some islets off its West end.

Magdalena is 8½ miles long, and to the S.W. it has several detached islets
and rocks. In the middle of the North shore the land slopes from the sum-
mit to a level sandy beach. It is thickly wooded, and about the same height
as the chief island, to the northward of it.

Maria Madre or *St. George* is 11½ miles long N.W. and S.E. Its highest
point is toward the South, and may be seen 50 miles off. From this point
it gradually declines in elevation to its low N.W. extremity.

San Juanito, the northernmost of the group, is a low island, about 2½ miles
long, and has off its N.W. point a remarkable steep white cliffy rock, re-
sembling the S.W. side of the island of *Maria Madre*. This side only has
been surveyed, and it terminates on the S.W. in a low projecting point.
On either side of the point is a small bay, which afford shelter against the
prevailing wind, protected by a sandy and rocky beach, which projects from
the South point of *Maria Madre*.

They were surveyed by Captain Beechey, whose directions, in connexion
with those for San Blas, are given below. Sir Edward Belcher also visited
them in 1838, and he says:—

"There is nothing inviting in either of the Marias. In the rainy season
water may flow, but from what I witnessed of the channels through which it
must pass, they should be well cleansed by floods before it would be fit for
consumption. What remained in the natural tanks was sulphureous and
brackish, although far above the influence of the sea, and formed by a strong
infusion of decayed leaves. By tracks observed, turtle appeared to have
visited the island lately, but none were seen or taken. Wood is plentiful,
particularly a species of *lignum vitæ*. Cedar, of the coarse species, used for
canoes, we met with, but none of the fine grain.

Fish appear to be numerous, particularly sharks. The capricious character
of the ocean about these islands renders visits at any time hazardous, as a
few moments may imprison the naturalist for weeks. Ten years since, nearly
to a day, I found landing on any part of these shores impracticable, although
the weather previously had been fine.

Here Vancouver tried ineffectually for water, and I was induced, by the
assertion of a master of a vessel belonging to San Blas, that wells were sunk
and good water conveniently to be had, to make this examination. It is
not improbable that if wells were sunk water could be obtained; but is the
result worth the trouble or risk? *

* The channel between the two North islands (*Magdalena* and *Maria Madre*) (*Tres*

There is nothing to make it desirable for a vessel to anchor at these islands. Upon Prince George's Island there is said to be water of a bad description; but the landing is in general very hazardous. There are passages between each of these islands. The northern channel requires no particular directions;* that to the southward of Prince George's Island is the widest and best; but care must be taken of a reef lying one-third of a mile off its S.W. point, and of a shoal extending $1\frac{1}{2}$ mile off its S.E. extremity.

From the South channel Piedra de Mar bears N. 76° E., *true*, about 4 miles. It is advisable to steer to windward of this course, in order that, as the winds during the period at which it is proper to frequent this coast blow from the northward, the ship may be well to windward.

The *Piedra de Mar* is a white rock, about 130 feet high, and 140 yards in length, with 12 fathoms all round it, and bears from Mount San Juan N. 77° W., 30 miles.

Having made *Piedra de Mar*, pass close to the southward of it, and unless the weather is thick, you will see a similarly shaped rock, named *Piedra de Tierra*, for which you should steer, taking care not to go to the northward of a line of bearing between the two, as there is a shoal which stretches the southward from the main land. The course will be S. 79° E., *true*, and the distance between these two rocks is very nearly 10 miles.

SAN BLAS.—To bring up in the road of San Blas, round the *Piedra de Tierra* at a cable's length distance, and anchor in 5 fathoms, with the low rocky point of the harbour bearing N. $\frac{1}{2}$ E., and the two *Piedras* in one line. This road is very much exposed to winds from S.S.W. to N.N.W., and ships should always be prepared for sea, unless it be in those months in which the northerly winds are settled. Should the wind veer to the westward, and a gale from that quarter be apprehended, no time should be lost in slipping anchor, endeavouring to get an offing, as a vessel at anchor is deeply embayed, and the holding ground is very bad. In case of necessity a vessel may cast anchor westward, and stand between the *Piedra da Tierra* and the Fort Bluff,

Marias) appears to be quite safe, and in the narrowest part has from 16 to 24 fathoms water, but the ground in other places is very steep, and at 2 miles distance from the shore there is no bottom with 100 fathoms. When the wind is from the northward it is calm in the channel, and a current sometimes sets to the southward, which renders it advisable, leaving the channel, to take advantage of the eddy winds which intervene between the coast and the true breeze to keep to the northward, to avoid being set down upon St. George's Island.—*Beechey*, vol. ii. p. 584.

* The mountains above San Blas may be seen towering above the vapour which hangs over every habitable part of the land near it. The highest of these, St. Juan, 6,230 feet above the sea, by trigonometrical measurement, is the best guide to the road of San Blas as it may be seen at a great distance, and is seldom obscured by the fog, while the other lands are almost always so.—*Beechey*, vol. ii. p. 584.

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order to make a tack to the westward of the rock, after which it will not be necessary again to stand to the northward of a line connecting the two Piedras.

The road of San Blas should not be frequented between the months of May and December, as during that period the coast is visited by storms from the southward and westward, attended by heavy rains and thunder and lightning. It is besides the sickly season, and the inhabitants having all migrated to Tepic, no business whatever is transacted at the port.

It is high water at San Blas at 9^h 41^m full and change; rise, between 6 and 7 feet, spring tides.

Captain Basil Hall says:—

Having passed about 8 or 10 leagues to the southward of the group called the Tres Marias Islands (the westernmost of which lies 54 miles West of San Blas by chronometers), steer a N.N.E. course, until Piedra Blanca comes in sight, when it would be advisable to steer directly for it, and pass about a league or two to the southward of it; from thence you will see Piedra Blanca de Tierra, which points out the harbour; for this you may steer direct, taking care not to go in-shore of the line of bearing of the two rocks, as a sand-bank lies off the coast about halfway between them, to a considerable distance, on the pitch of which there is only 2½ fathoms.

The watering-place is at a well dug near the end or commencement of a rope-walk, on the beach. The water is sometimes brackish, but improves by keeping.

Plenty of fish are to be caught at the anchorage, and oysters are found clustered to the roots of the trees on the banks of the river.

Early in June the rainy season commences with great violence, like the monsoons of the East Indies, and continues for six months, during which period there prevail violent squalls, a heavy rolling sea at the anchorage, thunder and dangerous lightning, and almost constant rain. The inhabitants, at this season, retire to the neighbouring town of Tepic, and to other parts of the country, not only to avoid the bad weather, but the ardent fevers which are prevalent.

In the evenings and mornings the air is so filled with mosquitoes and sand flies, that those periods, which otherwise would be the best to work in, are not the most suitable for communicating with the shore. There is always reason, too, to apprehend the effect of marsh miasma, in the mornings and evenings, at a spot so surrounded with swamps. There is no doubt, however, that this place is extremely unhealthy at times, and every precaution, especially against exposure at night, would be at all times of importance.

The following is by Captain Masters:—"In the rainy season, when the wind blows strong from the southward, a heavy swell sets in at San Blas, and as there is nothing to protect the anchorage, it must be felt very severely; but I never heard of any damage having been done to the shipping in consequence.

"There is some advantage in a vessel lying outside in the roads during the rainy season, for there the crews have purer air to breathe; and probably it might be more healthy than that of the port, besides being partially clear of mosquitoes and other tormentors of the same cast, which are very numerous. The crew also are easier kept on board. But if the ship has to discharge her own cargo, the expenses of doing it will be considered; and if her long boat is too small for that purpose, the launch, which must be hired, will most likely be manned by the crew; so that they are more liable to become ill, and being more exposed to the rain and sun, than if a vessel was in the port; and in the next place, their meals would not be very regular; they would also get spirits by some means, whoever was in charge of the boat or launch (providing that he should be even disposed to prevent it), whenever she went on shore.

"There are 13 feet water on the bar of San Blas, in the shallowest part of the entrance, and very seldom less even in the neaps. By giving the point which forms the harbour a berth of 15 or 20 fathoms, you will avoid a large stone, which is awash at low water, and is about 8 fathoms from the dry part of the rocks or breakwater. As soon as you are so far in that the innermost or eastern part of the breakwater is in a line with the other part of it inside, which runs to the N.N.E., it may be approached to within 10 or 15 fathoms, and by keeping well off from the low sandy point on the starboard hand as you warp up the harbour, you will have the deepest water. But as the sea sometimes in the rainy season (although but seldom) breaks over the breakwater which forms the harbour, it would be best to moor close under the high part of the land on which the old ruins of a fort stand, with the ship's head up the river, and a bower laid off to the eastward, and an anchor from the starboard quarter, from the larboard side to the shore, either by taking an anchor out or making fast to the rocks. It would be next to impossible that any accident could happen to the ship; the cargo can also be discharged with dispatch, and immediately under the eye of the master or mate, as the place where the cargo is landed would be about 100 fathoms from the ship. The ship's long-boat would do more inside than two launches if she was outside; and besides, when the sea is heavy in the roads, the discharging of the cargo could go on. As there are no established pilots here, it would be advisable to engage a person to point out where the stone lays. The captain of the port is the best to apply to, and if he does not come off himself, would most likely recommend a person.

Care must be taken in standing in for the land not to go to leeward of San Blas, as there is a strong southerly current along the coast, especially off Cape Corrientes.* If possible, keep San Blas on an E.N.E. bearing. The

* Captain Beechey came to San Blas from the northward, and on approaching it found himself more to leeward than he was aware, in consequence of the current setting out of

Tres Marias Islands, off the port of San Blas, are convenient points for making; and here a master could leave his vessel in perfect safety to water while he communicated with his consignees, or got his overland letters from his owners at home. There is a safe mid-channel course between the middle and southern islands. We brought a saddle-shaped hill on the main a little South of San Blas, one point open of the South island, and steered by compass N.E. by E.

The two Piedra Brancas, that of De Mar and De la Tierra, are excellent marks for the roadstead. A good anchorage for vessels awaiting orders (for which purpose San Blas is now almost alone visited, except by English men-of-war, and Yankee clippers for smuggling purposes) will be found with Piedra Branca de Mar, N. 70° W., De la Tierra, N. 43° W., and village in the Estero, N. 26° W.

Since the days of Hall and Beechey, the town of San Blas has very much changed. Its population of 20,000 have dwindled to 3,000, and their unwholesome appearance fully accounts for the decrease of residents; and nearly all its trade has been transferred to its rival, Mazatlan.

The large town of Tepic, in the interior, with a small factory, owned by an English merchant, causes a small demand for European luxuries, and a cargo or two of cotton; which petty trade is carried on during the six healthy months in the year.

The town is built on the landward slope of a steep hill, almost perpendicular to seaward, and its crest crowned by the ruins of a custom-house; but this being about three-quarters of a mile distant from the beach, a large assemblage of huts has been formed at the landing-place in the Estero del Arsenal, for the convenience of supplying the shipping.

In the Estero del Arsenal, small craft of less than 10 ft. draught will find convenient anchorage, means of heaving down, &c. The watering-place is at least 3 miles distant from the above anchorage, and to assist the boats in this heavy work, it would always be advisable to shift the vessel into such a position that they might make a fair wind off and on whilst the daily sea-breeze blows.

The watering-place is at the northern extremity of a large open bay South of San Blas. The beach is shoal, and the casks have to be rolled three or four hundred yards through the jungle to a stream of water. The stream during the spring tides is liable to be found brackish, but even then we succeeded in obtaining supplies, by immersing the empty cask with the bung in such a position that only the fresh water (which of course would be on the surface) could enter.

the gulf. To save time he passed between the two northernmost islands, and in doing so was becalmed for several hours, fully verifying the old proverb that the longest way round is often the shortest way home.—*Beechey*, vol. ii. p. 584.

By rigging triangles with spars in such a position that the boats could go under them to load, we succeeded in embarking daily 32 tons of water.

Many useful and ornamental woods are to be procured on shore, for the mere trouble of cutting, especially *lignum vitæ*. Fresh beef we found good in quality. Game moderately plentiful; oysters good and abundant; vegetables scarce and expensive. The climate may be summed up by the word *execrable*.

Mr. Jeffery, R.N., thus describes his passage from Acapulco to San Blas which will form a fitting supplement to the preceding:—

On the 8th of December, 1833, we weighed with a light sea-breeze, which enabled us to work out of the harbour. Towards the afternoon the wind increased from the westward, and continued to blow fresh for thirty hours, which is considered unusual on this part of the coast. We were nearly 60 or 70 miles off the land, and for the next ten days had nothing but calms and light variable airs alternately, and the weather excessively hot and sultry. At last we got in with the land, about 100 miles West of Acapulco, and on the 21st were off Point Tejupan. The only remarkable objects on this part of the coast are the Paps of Tejupan; they are two sharp hills on very high land. We now found the good effects of being close in shore, and I think it advisable for vessels making this passage to keep as near the land as possible, for in the daytime we had a regular breeze from the westward. It fell light about sunset, and then about 10 or 11 o'clock the land-breeze would come from the N.E. The advantage of keeping in-shore can seldom be doubted when we consider that vessels are frequently 40 or 50, and sometimes 60 days making this passage, through not keeping near the land. Between Tejupan and Cape Corrientes we found a current setting along the land to the westward from 12 to 15 miles a day. On the 28th, when within 30 miles of the harbour, we had very heavy rain and thick weather; we arrived on the 29th, and made the passage in 21 days. After rounding Corrientes, if the weather is clear, you will see the saddle mountain near San Blas; and to the N.W. of it another high mountain, with a remarkable peak at its N.W. extremity. If you look at it with a glass it will appear split in two, but to the eye it appears as one. This is so very remarkable that it ought never to be mistaken, as there is nothing like it on this part of the coast. When the above peaked mountain bears N.E. the anchorage at San Blas will bear N.E. also.

The watering-place at San Blas is in a bay to the eastward of the roads; you have to land the casks and roll them about 300 yards through the woods to a river. At high water it is rather brackish, but at all other times the water is excellent. Wood is very plentiful.

The fine season lasts from December to May inclusive. During that interval the sky is always clear, no rain falls, land and sea-breezes prevail; and, as there is no sickness, the town is crowded with inhabitants. From

June to November a very different order of things takes place; the heat is greatly increased, the sky becomes overcast, the sea and land-breezes no longer blow, but in their stead hard storms sweep along the coast, and excessive rains deluge the country, with occasional violent squalls of wind, accompanied by thunder and lightning. During this period San Blas is rendered uninhabitable, in consequence of the sickness and of the violence of the rain, which not only drenches the whole town, but by flooding the surrounding country, renders the rock on which the town is built literally an island. The whole rainy season, indeed, is sickly, but more especially so towards the end, when the rain becomes less violent and less frequent, while the intense heat acts with mischievous effect on the saturated soil, and raises an atmosphere of malaria such as the most seasoned native cannot breathe with impunity.

This being invariably the state of the climate, nearly all the inhabitants abandon the town as soon as the rainy season approaches, that is, by the end of May.

The whole of the coast about San Blas, Mazatlan, and Guaymas, is perfectly clear, and may be approached to within a short distance.

The year is divided into the two seasons described above. It must be remarked that the change occurs gradually, and its period varies. During the dry season the weather is constantly fine. The winds blow regularly during the day from N.W. and W., following the direction of the coast, and then give place during the night to a slight land-breeze or calms. The rainy season, which commences in June, is then indicated by calms and slight showers of rain. As the season advances the showers become heavier, and instead of beginning at night, they do so in the afternoon, and terminate by violent storms, accompanied with very dangerous lightning and thunder, the fierce winds blowing from all points of the compass. The weather keeps of this nature until the end of September, and it sometimes occurs that the season terminates by a terrible hurricane, which generally occurs from the 1st to the 5th of October, the festival of St. Francis. These hurricanes, which always blow from S.E. to S.W., are of short duration, but they are so violent, and raise such a heavy sea, that nothing can resist them. They are called in the country the *Cordonazo de San Francisco* (the lash with St. Francis's cord or belt). A vessel surprised when at anchor ought to slip her cables, or cut the moorings, and make sail. At the approach of the *cordonazo* she ought to gain an offing, or if obliged to keep in the road, to moor at such a distance off shore that she can easily get under sail on the first intimations of its approach. These observations are not applicable to roadsteads entirely open, but such ought to be avoided during the months of September and October. Sometimes the *cordonazo* occurs later than St. Francis's day; thus, on the 1st of November, 1839, twelve ships, who thought it had passed, were surprised in the Port of Mazatlan, and the

greater part were lost, and all perished. On the 1st of November, 1840, three vessels were lost in the road of San Blas, and several people were drowned, without it being possible to render them any assistance.

A monsoon has been observed on the N.W. coast of Mexico, and in the Gulf of California, arising from the *inversion of the trade winds*. In reality, this wind, almost constantly blowing from the N.E. in the Atlantic, in the parts North of the equator, is here supplanted by one from the S.W., and even by winds directly from the West. This inversion, which only prevails in the Vermilion Sea, is not experienced on the Californian coast, washed by the Pacific beyond the latitude of 23° North.

At 20 leagues N.W. of San Blas, in front of the mouth of the Rio San Pedro, lies the little isle *Isabel* or *Isabella*.

Isabel Island is of moderate height, and nearly barren; the herbage and grasses are scarcely to be distinguished. Neither water nor wood are to be got from it. The beach is lined with rocks, with the exception of a small sandy cove, open to the West, where boats may be hauled up on the shore. This island is only frequented by sealers. It is about a mile in length, and has two conspicuous needle rocks near its eastern end, in lat. 21° 15' 10" N., long. 105° 51' 35".

In lat. 22° 25' N. the small hills of Bagona are seen; and anchorage may be found in 8 fathoms near the N.W. point, sheltered from the N.E. winds. The mouth of the *Rio Bagona* is designated under the name of the *Boca de Teacapan* or *Tecapan*. At 8 leagues further North, the hillocks of *Chametta* are seen. The West point of the *Rio Chametta*, or *Del Rosario*, is in lat. 22° 50' N. It was in the small port formed by its continuation that Hernan de Cortes embarked, April 15th, 1535, on his voyage to discover California. A mile outside the depth is 8 and 9 fathoms.

On the coast several large farms are seen after leaving San Blas. These are the haciendas, *Del Mar*, *San Andres*, *Santa Cruz*, *Teacapan*, and *Del Palmito*. Bullocks may be bought at them for 8 piastres, and some vegetables. The water of all the rivers is good, and fine wood very abundant.

MAZATLAN lies 40 leagues from San Blas, and has supplanted the latter in its commerce, and consequent importance. It was surveyed in 1827 by Captain Beechey, who places the extreme bluff of Creston Island, lying off it, in lat. 23° 11' 40" N., long. 106° 23' 45" W., variation 10° 18' E.

The harbour of Mazatlan is entirely open to the winds which are most dangerous in the rainy season. It is formed by a bay, in the centre of which stands the town, but small vessels only can approach it. Larger ships anchor to the southward, under the lee of the *Island of Creston*, a small but very high island, forming the North side of the road. It is of a roundish form, and green at the top, but is perpendicular seaward, so that it appears only as a white cliff. Creston is separated from another island by a narrow rocky channel, and this last from the main land by a cable's length. In

approaching Mazatlan, Creston will be the first made out, seemingly detached from the coast. At 4 and 5 miles N.W. of it are two islets, called *Islas de los Pajaros* and *De los Venados*, which at a distance will appear like two patches on the coast, and will also serve to make out the anchorage, for it is the only point on this part of the coast where there is a group of islands. The anchorage used is that to the South of Creston, but the islets form between them and the main land another road, formerly used by the Spaniards, which is much to be preferred in the rainy season. It is sheltered from the South and S.W. winds, which prevail from the middle of June till the end of October, and blow heavily at times, and gives it the advantage of getting away between the islets, or between them and the coast; but as the prevalent N.W. winds of the dry season blow right into it, and raise such a heavy sea on the beach, that landing goods, &c., is a very difficult task, the anchorage South of Creston, where these inconveniences are not felt, is preferred.

The port of Mazatlan has been opened to foreign commerce for many years. Under the Spanish dominion it was unknown, but on the proclamation of the Mexican independence it was placed on a different footing; and Captain Sir E. Belcher says, that between his former visit in 1827 and that in 1839, it had increased from a village to a town.

The official name which was applied to it by the Mexican government is *La Villa de los Castillos*. Its population is less during the rainy season, but rises to 14,000 or 15,000 at the dry season, or when the vessels arrive. It has a very picturesque appearance both from land and sea, the houses being all light coloured, and in the better parts of the town handsome and commodious, the style being that of the old Castilian, suitable to the hot climate.

Ships ought to get their water in the peninsula which forms the South side of the road; everywhere else it is brackish. Although Mazatlan is less unhealthy than San Blas, severe fevers are common during the rainy season. Commanders should be strict in not allowing their men to run into any excesses, which are highly dangerous.

At 10 leagues to eastward of the port, on the road leading to San Blas and Tepic, and 3 leagues from the sea, is the old Presidio of Mazatlan. There are no vestiges of the fortification, and the fine barracks built by the Spaniards only serve now to shelter a few cavalry soldiers. The Rio de Mazatlan, which runs near the Presidio, falls into the harbour.

Captain Sherard Osborn, R.N., speaks rather more favourably of the climate. He says (1846):—The coasters run up the river to the new town of Mazatlan, which has risen to considerable importance within a very recent period, notwithstanding the disadvantages it labours under from the paucity

of supplies, both animal and vegetable, and from the water being both bad and scarce. Mazatlan is now the outlet for the products of the valuable mining district of San Sebastian, and imports directly large cargoes of English goods. The general healthiness of the climate, as compared with its neighbour San Blas, has materially tended to an increase of its population. The town, from being built on the crest of some heights, clear of mangrove and swamp, had an air of cleanliness and pure ventilation rare in this part of America. Vessels invariably moor in the roadstead, open hawse to W.S.W., and too close a berth to Creston Island is not advisable, as the squalls sweep over it with great strength.

Capt. Beechey's directions are as follow :—

The anchorage at Mazatlan, at the mouth of the Gulf of California, in the event of a gale from the south-westward, is more unsafe than that at San Blas, as it is necessary to anchor so close to the shore, that there is not room to cast and make a tack. Merchant vessels moor here with the determination of riding out the weather, and for this purpose go well into the bay. Very few accidents, however, have occurred, either here or at San Blas, as it scarcely ever blows from the quarter to which these roads are open, between May and December.

There is no danger whatever on the coast between Piedro de Mar and Mazatlan; the land is a sure guide. The Island of Isabel is steep, and has no danger at the distance of a quarter of a mile. It is a small island, about a mile in length, with two remarkable needle rocks near the shore, to the eastward of it.

Beating up along the coast of Sonora, some low hills, of which two or three are shaped like cones, will be seen upon the sea-shore. The first of these is about 9 leagues South of Mazatlan, and within view of the island of Creston, which forms the Port of Mazatlan. A current sets to the southward along this coast, at the rate of 18 or 20 miles a day.

Having approached the coast about the lat. of $23^{\circ} 11' N.$, Creston and some other steep rocky islands will be seen. Creston is the highest of these, and may be further known by two small islands, Venado and Pajaros, to the northward of it, having a white, chalky appearance. Steer for Creston, and pass between it and a small rock to the southward, and when inside the bluff, luff up and anchor immediately, in about $7\frac{1}{2}$ fathoms, the small rock about $S. 17^{\circ} E.$, and the bluff $W. by S.$ Both this bluff and the rock may be passed within a quarter of a cable's length. The rock has from 12 to 15 fathoms within 30 yards of it in every direction. It is, however, advisable to keep at a little distance from the bluff, to escape the eddy winds. After having passed it, be careful not to shoot much to the northward of the before-mentioned bearing ($W. by S.$), as the water shoals suddenly, or to

reach so far to the eastward as to open the *West* tangent of the *peninsula*, with the *eastern* point of a low rocky island S.W. of it, as that will be near a dangerous rock (the *Blossom Rock*), nearly in the centre of the anchorage, with only 11 feet water upon it at low spring tides, and with deep water all round it. There may be a buoy upon it; but should this be washed away, its situation may be known by the eastern extreme of the before-mentioned low rocky island (between which and Battery Peak there is a channel for small vessels) being in one with a wedge-shaped protuberance on the western hillock of the northern island (about 3 miles North of Creston), and the N.W. extremity of the high rocky island to the eastward of the anchorage being a little open with a rock off the mouth of the river in the N.E. The South tangent of this island will also be open a little (4°), with a dark table hill on the second range of mountains in the East. These directions will, I think, be quite intelligible on the spot.

The winds at Mazatlan generally blow fresh from the N.W. in the evening; the sea-breeze springs up about 10 in the forenoon, and lasts until two o'clock in the morning.

It is high water at this place at $9^h 50^m$, full and change; rise, 7 feet, spring tides.

To these may be added the following extract from the remarks by the French Admiral Du Petit Thouars:—

In approaching Mazatlan there is no difficulty. The latitude of the port must be gained, or rather a few minutes to the North of it, on account of the currents which generally run strong out of the Gulf of California, and which would thus send a ship to leeward of the port. In clear weather the land may be seen at 40 or 50 miles off, and, if you are on the parallel of Mazatlan, the first which will be seen will appear in the N.E., the N.E. $\frac{1}{2}$ E., or E.N.E., according to the distance. Nearing the land it will be seen successively extending towards the South as far as E., and even as E.S.E. From the offing nothing can be made out. The land on the shores is generally very low, and, in the first instance, only the interior high land will be seen; and it is only when you are within 18 or 20 miles of the coast, for example, that its different points can be distinguished. The islands of *Creston*, *Venado*, and *Pajaros* will be made out; the first seen is Creston. As soon as all uncertainties of the position of Mazatlan cease, steer either for the anchorage of Venado or that of Creston.

In proceeding for Venado, with the ordinary winds of the season, steer for the S.W. point of Venado Island, carefully looking out for and avoiding a small rock awash, called the *Laza*, which lies about 200 yards from this point, and does not always break: after having passed this rock, which may be done within a hundred yards, bear more to the northward to enter the

bay, and bring the S.W. point of Venado to bear West, or even W.S.W., according as you intend to anchor more or less within the bay.*

The subsequent description and directions are by Captain Masters, who we have before quoted. It must be premised, however, that his names differ in some few points from those of the Admiralty chart. We have therefore altered them to agree with that, leaving the originals within parentheses.

Mazatlan is a port very easily made. It is formed by a cluster of islands; to the southward of them is a long line of beach, with low land, thickly covered with trees, running several miles in before it reaches the foot of the mountains, and continues the same as far to the southward as the North side of the bar of Tecapan, where the land is high.

The port of Mazatlan, at its entrance, is formed by the island of Creston on its western, and Ciervo Island on the eastern side. From the sea the former has nearly a regular ascent, the length of the island lying from East to West, where it terminates in an abrupt precipice, and is covered with small trees. It has from 8 to 10 fathoms water to within a few fathoms of it. The Island of Ciervo has a very similar appearance, and is about half the height of Creston, being partially covered with trees. These islands can be seen several miles before the land at the back of the town makes its appearance. The outer rock is situated well outside the roadstead, and forms nearly an equilateral triangle with the islands of El Creston and Ciervo; it is about 8 feet high, and nearly the same in breadth, and from 7 to 8 fathoms long from North to South. There are 5 fathoms water close to it.

At two-thirds of a mile N.W. of Creston are two islets called the *North* and *South Hermanos*, lying S.W. and N.E. of each other, and a quarter of a mile apart. There is a small reef off the East point of the former. At a quarter of a mile W.N.W. of the latter is the Tortugas Rock, about 2 feet above water, and apparently not more than 20 or 30 feet long.

In the excellent plan of the harbour of Mazatlan the soundings in general are very correct; but the stranger, in coming to an anchor in the night time, should not attempt to pass within the line from the outer part of El Creston to El Ciervo, but anchor outside in from 9 to 12 fathoms, where he will find sand and mud. Within the port is a long sand, which extends out from the bottom of it, a great part of which is dry at low water, and is shoal for some distance to the S.E., extending nearly as far as the Island of Ciervo, with a boat channel between it and the island. The inner anchorage is to the westward of this sand. It is said that the bank is increasing, and that the port has filled very much within a few years past.

* Du Petit Thouars, *Voyage du Venus*, vol. ii. pp. 175-6.

In the summer season large vessels anchor between the two islands at about a third the distance from Creston to Ciervo, and moor East and West. The depth of water is from 7 to 9 fathoms, sand and muddy bottom. A vessel drawing 12 feet water might go inside to the minor anchorage without the least risk; but, as the pilot has launches to get employed, he cannot be persuaded to take a vessel in even drawing 9 feet.

North of the island of Creston, and between it and the main land, is the island of Azada (Gomez), which is low, and is separated from Creston by a narrow boat channel. From about the middle of Azada a bar extends to the eastward across the port nearly to the sand-bank already mentioned. The pilot informed me that there were patches of shoal water on it when the water was low, not having more than 6 feet on them, which might be the case; but where I sounded there was not less than 12 feet. Inside the bar it deepens to 4 or 5 fathoms, and close up to the town, abreast of the custom-house, at low water, there are from $2\frac{1}{2}$ to 3 fathoms, with a sandy bottom.

When the wind blows strong from the N.W. there is a short chop of a sea heaves in between the island of Gomez and Point Pala (Calandare), although the distance they are apart is short, but by anchoring, as already mentioned, opposite Creston, most of it is avoided.

In the rainy season it is very unsafe to lay inside, as gales come on from the southward, which bring in a heavy sea. Vessels of all sizes anchor in this season in the outer roads, between the islands and the outer rocks, from which they can be got under way, and stand clear of the coast.

To the northward of the present port of Mazatlan, about 5 miles, is the N.W. Port of Mazatlan. It is a very fine bay, and well sheltered from the N.W. winds by Venado and Pajaros Islands. It was in the southern part of this bay that vessels formerly discharged their cargoes, but the present port being more secure, it was established in its stead.

Watering is attended with great risk at all times in this place, especially at full and change, the boats having to cross the heavy surf of the bar formed between a long spit which runs down the centre of the river, and a bank joining it from the South shore. Several boats and lives are annually lost here. In pulling in care should be taken to cross the surf pretty close to the middle ground, and, when through the first rollers, to pull over to the South shore, and keep it on board up to the watering place. In coming out no casks ought to be allowed in the head sheets, everything depending upon the buoyancy of the boat.

The water is procured from a number of wells dug by seamen, on a low alluvial island, formed on a quicksand in the bed of the river; none of them are consequently more than 10 feet deep. The water is by no means sweet,

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A pilot is always in attendance; pilotage $1\frac{1}{2}$ dollar per foot, and 5 dollars for the assistance of a boat. There are 12 feet on the bar, but 18 feet inside. Discharging costs about 1 dollar 50 cents per ton, and is always at the merchant's expense. Tonnage dues 1 dollar per ton when loaded, in ballast, free. Labour 2 dollars per day. Sand ballast $1\frac{1}{2}$ dollar per ton; stone ditto $2\frac{1}{2}$ dollars. Water 3d. per gallon. Beef 12 cents per lb. Weights and measures are the same as those of Spain.

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CHAPTER III.

THE GULF AND PENINSULA OF LOWER CALIFORNIA.

WHEN Cortes had conquered Mexico, the Spanish emperor (Charles V.) granted him great titles of honour, but limited his authority to the idle command of troops reduced to inaction. Thus confined, his ardent spirit entered into new projects of extending the knowledge of the hitherto all but unknown countries in the West. In one of these expeditions California was first discovered by Fortun Ximenes, the pilot of the *La Concepcion*, a vessel sent by Cortes to explore the coast to the N.W. of Acapulco. Ximenes having murdered the captain (Diego Bezzerro), in November, 1533, to avoid the consequences sailed to the N.W., and anchored in a port which is probably on the Gulf of California, and was attacked and slain by the Indians on shore. This appears to have been the first discovery of California.

The Gulf of California was first formally explored by Francisco de Ulloa, by direction of Cortes. He had under him three vessels, which sailed from Acapulco in July, 1539. This was the last expedition of discovery in which Cortes was concerned.

The name of California is of uncertain origin. It is not known to have been used by the natives in any part of the country. It has been conjectured that it is derived from the heat of the weather experienced here by Cortes, but of this we are not told. By some it is thought that it is derived from a custom prevalent throughout California, of the Indians shutting themselves in ovens until they perspire profusely. It is not improbable that the custom appeared so singular to Cortes, that he gave it the name in consequence. It has also been considered as a corruption of *calofon*, the Spanish term for resin ; the pine trees yielding it being in such profusion here.

The peninsula is sometimes called Old or Vieja California, in contradistinction to Nueva or New California, the *later* discovery, hence the appellation. California *Baja*, or *Lower*, is also a term of some antiquity ; and the distinction of Baja and Alta, Lower and Upper, seems to be that now more

generally recognised, since the United States have denominated their portion of the territory from its *higher* latitude.

During the seventeenth and eighteenth centuries, large quantities of pearls were procured by the Spanish adventurers, and these pearl fisheries in the Gulf of California increased in fame.

At the period of its greatest prosperity, about 600 to 800 divers were employed; the fishery being carried on in small vessels of 15 to 30 tons burden. In 1831 four tolerably large vessels, from Mexico, with 180 divers, together obtained pearls to the value of £2,660.*

The PENINSULA has remained, until quite recently, almost unknown to the civilised world, and its Spanish possessors have done nothing to explore its capabilities, in all the centuries it has been in their possession. The maps, therefore, have been strangely defective. But since Upper California has been developed into one of the most prosperous countries in the world, a new interest in it has been created. This led to the purchase of the central portion of the peninsula by a New York Trading Company of the Mexican Republican chief, Juarez, in 1866. An exploring expedition, consisting of Mr. J. Ross Brown, Mr. W. M. Gabb, and Dr. Ferdinand Lochr, was organised in 1867, and we now know from their report much more of the peninsula.†

The inhabitants are not more than 6,000 in number, chiefly half-castes, in whom Indian blood predominates, and this is the entire population of an area 540 miles long by 50 in average breadth. The land of the peninsula gradually slopes, or forms a succession of plateaux, from the shores of the Pacific to within a few miles of the eastern coast, where it terminates in abrupt precipices, from 3,000 to 4,000 feet in height, facing the Gulf of California. This singular conformation suggests the idea that the peninsula forms only one-half of a mountain range, divided longitudinally, of which the corresponding or eastern half has disappeared along the depression of the gulf. The narrow tract between the foot of the high escarpment and the gulf shores is broken into ridges and valleys, forming a sort of undercliff, and clothed with a luxuriant semi-tropical vegetation.

* The most valuable pearls in the possession of the court of Spain were found in the gulf in 1615 and 1665, in the expeditions of Juan Yturbi and Bernal de Pinadero. During the stay of the Visitador Galvez in California, in 1768 and 1769, a private soldier in the *presidio* of Loreto, *Juan Ocio*, was made rich in a short time by pearl fishing on the coast of Cerralvo. Since that period the numbers of pearls of California brought annually to market were almost reduced to nothing. The Indians and negroes who followed the severe occupation of divers have been frequently drowned, and often devoured by sharks. The divers have always been poorly paid by the whites.—*Alcedo*, 1765—69.

† Official Report on the mineral resources of the United States for 1868, by Mr. Ross Brown, page 630. The work contains much valuable geographical information.

The rocks of this long mountain range are of modern geological date, or the tertiary period, but the southern and northern portions are differently constituted. Here the slope and escarpment are replaced by a chain of granitic mountains. In the South, the peak of St. Lazaro rises to a height of 6,000 feet, being the highest point. Most of the central part is bare of trees. One half the population is concentrated in the picturesque valleys of the granite range in the South, where the flourishing silver mines of Triunfo are situated. There are here three or four small towns, but in the rest of the territory only small scattered villages and mission stations are to be met with.

There are some tolerable harbours, but, from the foregoing reasons, they are ineligible for the site of large towns. It is said to be rich in minerals, and near its South extremity there are said to be some rich argentiferous lead mines, but these and others have been comparatively little worked. Timber, and indeed vegetation itself, is very scarce, by far the largest portion of the surface being incapable of producing a single blade of corn. In some of the sheltered valleys fruits suitable to a warm climate have been successfully cultivated, and wine has been made and exported. Cattle are rather more numerous than would have been supposed, as they feed on the leaves of the musquito tree, a species of acacia. Some observations of the climate of the gulf are given presently; but for the land it may be said to be excessively hot and dry. Unlike Mexico, the rains, except in the most southerly parts of the peninsula, occur during the winter months; summer rains scarcely occur North of Loreto. Near lat. 26° violent earthquakes are not uncommon.

In the subsequent descriptions the works of Capt. Sir Edward Belcher, of H.M.S. *Blossom*, who surveyed several of its ports; that of Du Petit Thouars; of M. Duflot de Mofras; the voyage of Captain George Vancouver, in 1793, and the interesting volumes by Dr. Wm. Bell, 1869, &c., have been consulted.

The GULF OF CALIFORNIA may be considered to terminate on the South at Mazatlan and Cape St. Lucas. These points have been geographically fixed by modern science, and Guaymas also, farther North, has been determined. Dr. Coulter, and Lieutenant-Colonel Emory, U.S.E., made some observations on the Rio Colorado at its head, and the result of these determinations has been to remove the Gulf further to the East than had been previously exhibited on the charts, thus giving the peninsula a greater breadth than it had been supposed to have; but this cannot be considered as finally determined.

This gulf was designated by the first Spanish navigators under the name of the Red or Vermilion Sea (*Mar Rojo*, *Mar Vermejo*), on account of the colour of its waters, and for its resemblance to the Red Sea of Arabia. The learned Jesuit missionaries traversed it entirely, calling it *Seno* or *Mar*

Lauretaneo, Gulf or Sea of Loreto, in honour of the Virgin, their protector and patroness, and it has been called the *Sea of Cortes*, from the great general.

The length of the gulf is about three hundred leagues; its greatest breadth is 60 leagues at its entrance; but throughout its extent the distance from one side to the other does not vary but from 25 to 40 leagues. Beyond the thirty-first parallel, its breadth rapidly diminishes to the Rio Colorado, which falls into it at its head.

It has been often remarked, that a singular phenomenon occurs here, which science does not explain, and of which we possess but few examples. It is that of rain falling when the atmosphere is quite clear, and the sky perfectly serene. The savant Humboldt and Capt. Beechey have related the fact; the first having testified as to its occurring inland, the second in the open sea.

The tides are felt throughout the Gulf of Cortes; their height varies with the direction and force of the wind, and the configuration of the coasts: thus it is 7 feet at Mazatlan, the road of which is open, and at Guaymas, the port of which is full of islets, and sheltered from the wind, it does not exceed 5½ feet.

Independently of a great number of fish, of a variety of species, there are two species of immense shark found in the gulf (*el tiburon* and *la tintorera*), which often seize the pearl fishers. Whales are also met with in considerable numbers, but, up to the present time, no whaler has pursued them. On the islands are numerous seals and sea-calves. The pearl fishery is, or rather was, also followed, as stated in the introductory remarks.

The two shores of the Vermilion Sea run parallel with each other toward the N.W.; they are very low and full of salt marshes, tenanted by alligators, reptiles, and insects. The general aspect of the country is horrible; the imagination cannot conceive anything more naked, more desolate. There is an entire want of water and vegetation; there are only mangroves, and some thorny plants, such as the *cactus*, magueys (aloes), or acacias, to be seen. Orange trees or palms are rarely met with, and one must proceed some leagues into the country to find vegetable mould. The shore is formed by sand and lands quite unfit for cultivation.

At the entrance of the gulf, on the eastern side, the summits of the *Sierra Madre* may be seen in the distance; these separate the provinces of Jalisco, Sinaloa, and Sonora, and those of Nuevo Mexico, Chihuahua, and Durango. The coast of Lower California presents, without interruption, a series of rugged peaks of volcanic origin, and without any vegetation. This mountain chain, which comes down from the North, and extends throughout the whole peninsula, gradually decreases in elevation as it approaches Cape San Lucas.

The eastern side of the gulf is comprised in the Mexican provinces of Si-

naloa and Sonora, separated by the Rio del Fuerte. Their principal riches consisted in their gold and silver mines, of course now eclipsed by Upper California. There are some considerable cities in the two departments. The chief are in Sinaloa, Culiacan, the residence of the governor, &c. Rosario, above Mazatlan, has, or had, the quarters of the troops. Up to 1839 Arispe was the capital of Sonora, in which year it was carried 40 leagues to the South, on account of the incursions of the Apache Indians. It is now at the ancient mission of S. José de los Ures. The port of Guaymas concentrates all the maritime affairs of Sonora, and Hermosillo is the centre of its commerce and riches. In the North part of the state large quantities of gold have been found.

Mr. Jeffery, R.N., who was here in January, 1834, makes the following observations in his journal:—In the Gulf of California two winds are prevalent during the year. The N.W. from October until May, and the S.E. from May until October. During this former wind fresh breezes and fine weather will prevail, and a vessel making a passage up the gulf should keep the western shore on board, and she will find a little current in her favour, while on the eastern shore it will be against her. When the latter wind prevails you get nothing but heavy rains, oppressive heat, and sultry weather, and the reverse must be observed with respect to the currents.

N.B.—The above is a copy from an old Spanish manuscript, and we proved it correct when we made the passage in 1834."

The **COAST** between Mazatlan and Guaymas is but little known or frequented. The interior country is an important mining district, which has been worked from the earliest times, and still affords, with due prudence and skill, an almost inexhaustible supply of silver, copper, and gold. The latter is thought to be too capricious to be profitable, and many of the copper and silver mines have brought ruin on their proprietors through extravagance and mismanagement. Another article of export is dye-wood, which is shipped from the river entrances.

The coast northward of Mazatlan is low and swampy, the first place worth notice is the *River Elota*, 43 miles from Mazatlan, nearly dry in the hot season, but a turbid torrent in the wet one. Up the river a few miles is the pueblo of *Elota*, standing in a thinly populated and partially cultivated country, of no interest to commerce. The village is near the foot of the Sierra Madre range of mountains, which runs generally parallel with the coast.

The *Rio San Lorenzo*, or *Great Tawala River*, is 34 miles beyond the Elota, and is of similar character. At 20 miles from its mouth is the pueblo of *Cosala*, a well known mining place of about 4,000 inhabitants, with many gold and silver amalgamation works. Large numbers of cattle are reared, and the climate, though very hot, is considered to be healthy.

The *River Culiacan* is about 46 miles beyond the San Lorenzo, and is

used to float down the large quantities of Lima or Nicaragua wood cut from all parts of the mountains in this vicinity. *Culiacan*, the capital of the province of Cinaloa, is on the river 23 miles from its mouth. It has been a handsome Spanish town, and still contains some wealthy inhabitants, occupied with the numberless silver mines in the adjoining Sierra. The largest building is the Casa de Moneda, a mint, built by English engineers.

ALTATA is the port of Culiacan, on the North side of the entrance of the river. It is thus described by Captain G. H. E. Horn, of the Hamburg barque *Colima*. On leaving Manzanillo in the rainy season, a passage to Altata is very easily made, carrying a fair wind all the way; but in the dry season when the N.W. wind is blowing, much difficulty is then found, as strong winds and currents are against you at that time. It is advisable to hug the Mexican coast, in order to anchor, in case it should fall calm, as it generally does at night; by standing out of anchoring ground you will drift back in the calm, nearly as much as you have gained by beating up. On the passage you will sight the Cerro of St. Sebastian, the position of which assigned to it on the charts from the Spanish survey, may be depended on. Having approached about lat. $24^{\circ} 39'$ or $24^{\circ} 40'$ N., long. $108^{\circ} 10'$ W., the saddle-shaped hill of Tamasula will bear N.N.E. $\frac{1}{2}$ E., you are then W. by S. from the anchorage, distant 7 miles. Steer E. by N., and anchor as soon as you are in 8 fathoms water, muddy bottom. On steering for the anchorage of Altata, if the lat of $24^{\circ} 35'$ N. is passed, take care not to near the shore too much, as there are reefs, stretching out several miles to the southward. It is by no means safe to anchor too near the shore. In case it should come on to blow, you have to slip your anchor and stand out to sea until the weather moderates. The filling and procuring water at Altata is difficult and expensive: it cannot be done with the ship's boats and crew, but you have to employ men from shore, who fetch it in small kegs on mules from a plain inland where it is dug for. Thirty hogsheads cost me while I was there 20 dollars, and 30 dollars more for bringing on board.

Position of Altata, lat. $24^{\circ} 40' 12''$ N., long. $107^{\circ} 57' 41''$ W.

By attending to the following directions, the mariner not acquainted with the place will be enabled from the roadstead to find the boat channel leading to Altata. From the anchorage, a conspicuous white house in Altata will bear E. $\frac{1}{4}$ S., this is also the bearing of the bar from the boat channel, which lies beyond a low lagoon island, the N.W. extreme of which has to be rounded to gain the entrance. From the anchorage steer for a white sandy height, to the westward of Altata; as you approach the surf you will perceive, a little to the westward of several small hillocks forming a part of the above mentioned height, the trunk of a broken tree, which you must bring on the starboard bow, and standing on it in that direction you will see smooth water through the surf; running in till within a boat's length of the beach, you will have passed the rollers, and you must then turn along the beach towards

Altata River, where further directions are unnecessary, the eye being the best guide. Should the broken tree be sanded over, or be taken away, it will be difficult for a stranger to find the boat channel, and it is then recommended to steer direct for the white sandy height, and wait at the back of the surf until, as is commonly the case on the arrival of strange vessels, some person on shore by motions points out the entrance.

The coast hereabout is badly represented on the charts, and, being very low, this is the more important, as an extensive shoal skirts it for some miles. It was more particularly described by Capt. S. Richmond. He found (July 8th, 1854), shoal water, $4\frac{1}{2}$ fathoms, with Altata bearing N.E., distant 9 to 12 miles (which is more than probably in excess), and just inside of this depth, the sand rose above the surface). It extends from the S.W. of Altata to the Macapule River, lat. $25^{\circ} 27' N.$, a distance of 60 miles, the western edge trending to N.W. by N. It was stated to him that there was a narrow channel close in shore, used by coasting and also by other vessels, especially contrabandistas.

San Ignacio Island is in lat. $25^{\circ} 39' 30''$, according to Lieut. G. H. Derby, U.S. Top. Eng. It is a barren rock, called a Farallon by the Spaniards, which he says is about 5 miles long, and 2 or 3 broad. Other authorities make it very much smaller, and about 200 feet high, entirely uninhabited, and only resorted to by seals and sea-birds. It is a good land mark for those passing up or down the gulf.

Nova Chista, a small coasting port, stands on the North side of the entrance to the *Rio de Sinaloa* or *Cinaloa*. The river is useless for navigation. At about 6 leagues up the river is *Cinaloa*, a Spanish town, built on a hill, and formerly of some importance, but since decayed and now almost desolate. *San Ignacio Point*, to the N.W. of *Nova Chista*, is about 90 miles from Altata. It forms a projection to the southward, and having to the East of it *San Ignacio Bay*. The point, according to the charts, is surrounded by reefs and from 3 to 6 miles to the South of it, is the *San Ignacio Rock*, before mentioned.

We have only very vague accounts of this coast, but it is said to be shoal and difficult to approach. To the North of the point is the *River Joroaco*, quite unimportant; and at 40 miles beyond is the *River Maria de Aome*, falling into the head of a bay. The road from *Nova Chista* to the mining districts of Chihuahua, which crosses the upper course of the *River Maria*, is described by Mr. Sevin as being over undulating ground, and fit for wag-gons or carts, goods being conveyed a distance of 60 travelling leagues for three dollars per cargo of 300 lbs.

The Río del Fuerte is of more importance than many hereabout, and debouches at 80 miles northward of *Point Ignacio*. A considerable body of water comes down it in the rainy season, and by it are floated in rafts and flat boats large quantities of the Lima or Brazil dye-wood.

El Fuerte, a town at 70 miles up the river, has declined, though it is near an important mining region. An Indian town, *Arboleta*, stands on the South side of the entrance. The river divides the States of Sinaloa and Sonora.

At 25 miles beyond the Rio del Fuerte is the entrance of the *Rio del Mayo*, which is fronted by a bar, and flows through very low land. An Indian town, *Santa Cruz de Mayo*, stands at its mouth. *Lobos Point*, in lat. $27^{\circ} 17'$, according to Mr. Boxer, R.N., is very low and dangerous, and requires great caution when approaching Guaymas, as the south-easterly current out of the gulf sets past it with great strength. From this to Guaymas the distance is 40 miles. There is anchorage in 6 fathoms at 5 leagues N.W. of the Rio Mayo. At 4 leagues from Guaymas is the *Rio Yaqui*, the banks of which are inhabited by some Indians of that tribe.*

The waters of the river are much used for irrigation, and excellent oysters are found in the entrance, and are carried to Guaymas.

Though none of these rivers are navigable, the entrances of some of them will admit coasters.

GUAYMAS is the principal harbour of the Mexican state of Sonora, but it is of much less importance than Mazatlan, which has at least six times the amount of trade, because the back country is well peopled, whereas northern Sonora is almost uninhabited. Dr. Bell says that the true harbour of Guaymas covers an area of a little less than four square miles, in which three small islands, the rocky peaks of submarine hills, rise perpendicularly from a depth of from 3 to 4 fathoms, and form a little inner harbour. From the bare volcanic mountains which enclose the harbour several irregular little promontories project into the water, and occupy much valuable space. The total area, in fact, of water, more than 4 fathoms in depth, does not exceed half a square mile. The entrance is not quite a mile wide, and is guarded by a long rocky island, called Pajaros, 212 feet high, lying exactly in front and outside of it, which makes the harbour doubly secure.

It is thus described by Lieut. Derby in December, 1851:—The harbour of Guaymas is one of the best upon the coast; it is perfectly land-locked and protected by its numerous islands from every quarter. It has been so often and so well surveyed, that it is unnecessary for me to enter into a minute description of its merits. It is to be regretted, however, that it has not more water, from 4 to 5 fathoms being the average depth, which is insufficient for a ship of the line, or even a first-class frigate. We found

* This river may become of some importance hereafter, for Dr. William A. Bell states, 1869, that there are extensive *coal fields* on both sides of the Upper Yaqui River, of a quality equal in every respect to the finest coal of Newcastle or Pennsylvania. The nearest coal to Guaymas is found at San Marcial, 60 miles distant: although this important fact will have great weight with the future of Sonora, the mines are at too great a distance from the shore to be available now.

Guaymas a dirty place, with a dirty population of about 1,500 or 2,000. The houses being built of *adobe*, with the roofs sloping towards the interior, have a very unfinished appearance, and from the harbour the town presents the appearance of having been abandoned when half built. There are two small piers in a ruined condition; and near the landing a large pile of earth, surmounted by two or three crumbling walls, over which floats from a lofty staff the flag of Mexico, marks the site of the *adobe* fort, knocked down by the guns of the *Dale* during the late war. There are several wealthy individuals in Guaymas, who monopolize the whole of the business with the interior of Sonora, but the mass of the population are in a state of wretched poverty. One or two small vessels from San Francisco were lying in the harbour, the proprietors of which had purchased everything in the shape of fresh provisions to be obtained. Sheep in large numbers they had purchased from the interior of Sonora with the intention of landing them at Molexe, on the Californian coast, thence driving them overland to San Francisco. Fowls, turkeys, ducks, goats, everything that could be purchased for one real and sold for twenty had disappeared, causing us no little difficulty in obtaining fresh provisions, even at comparatively high prices. The water at Guaymas is obtained from wells, and is slightly brackish. Excellent oysters are brought from the river Yaqui, which empties into the bay about 20 miles South of the town, and sold to the shipping at a dollar a bushel; the Mexicans, however, make no use of them.

The time of high water at full and change of the moon at Guaymas is not very accurately determined; it is, however, between 8 and 9 a.m. The ordinary rise of spring tides is 6 feet, neap tides 4 feet. The phenomenon of four tides in twenty-four hours has repeatedly occurred here, as I am credibly informed. The prevailing winds in May, June, and July, are from the S.E. and S.W. The thermometer during the summer months ranges from 92° to 98° Fahrenheit, the maximum 110°; during winter from 56° to 60°, minimum 45°. Guaymas is in lat. 27° 54' N., long. 110° 49' 10" W.

Captain Henry Trollope, R.N., gives the following directions:—Guaymas once having been seen cannot, with ordinary attention, be mistaken; the whole coast is so remarkable that one is only at a loss to say which is the most prominent land-mark; nevertheless, as Pajaros Island lies right before the entrance when 10 or 12 miles to the eastward, it is a blind harbour; a stranger without a chart might well be in doubt as to the entrance. Cape Haro, a bold, bluff headland, jutting out due South to seaward, and rising with a wall-like cliff 200 feet from the water, is the best mark for the harbour; it has 14 or 15 fathoms touching the rocks, and the entrance between Trinidad (an island so called from the distinct manner in which it is formed in three divisions united at their base) and Pajaros is clear and free from danger, only taking care to give the points, particularly Punta Baja, a berth of half a cable's length; the lead is quite sufficient guide for going in.

Secondly, the white smooth beach of Cochore, extending uninterruptedly from the Morro Inglese at the entrance of the harbour, 12 miles to the eastward, and terminated suddenly by a still more remarkable hill, called Cerro Tordillo, or, as we termed it, Morro Afulva, lies in such contradistinction to the extraordinary mass of hills forming the peninsula, out of which the harbour of Guaymas is hollowed like the crater of a volcano, that it is from the contrast almost equally remarkable. Further to the northward are the remarkable peaks called Tetas de Cabra (Goat's Teats). Some have recommended these to be made, as the prevalent wind is from N.W., and there is certainly no advantage to be gained by getting over on the Cochore shore, while by making the land to the windward of Cape Haro a ship will have the prevalent breeze and current in her favour. The Tetas de Cabra are about 10 miles N.W. by W. of Cape Haro; they stand on the West shore of a large deep bay, which has several patches of rocks and islets in it. Pajaros Isle forms of itself an excellent harbour; in fact, the space between Trinidad, Pajaros, and Morro Inglese is equal as far as security, and superior as to depth of water, to the harbour itself; the advantage the latter has, is in there being a better access into the interior. The tides are very irregular, except at full and change; there appears to be only one tide in the twelve hours, but then the usual interval occurs between high and low water. The greatest rise and fall we observed during our stay was 4 feet. High water 8^h a.m.

The harbour of Guaymas is recognised from the offing by a mountain surmounted by two peaks, which are called Las Tetas de Cabra, from their supposed resemblance to the teats of a goat. When this is made out, run along the coast, leaving it a little to port, and the island of Pajaros, which forms the East side of the entrance, will soon be seen. Then steer so as to leave it to starboard, entering the channel between it and the land, and the town and harbour will soon be discovered. The entrance of the harbour once doubled, two islands are seen in the inner part of the bay, and you pass between these to reach the anchorage, near or off the land, according to the draught of water. Vessels under 100 tons make fast to the landing-place, and those drawing 12 to 15 feet anchor a quarter of a mile off, in 3 or 4 fathoms. Large ships ought to cast anchor outside these islands in 6 or 7 fathoms. This harbour, which would hold a considerable number of vessels, is very safe in all seasons; the bottom is good holding ground, and it is sheltered from all winds, and forms a large basin, surrounded with islands, which prevent any heavy swell reaching it. The bank lying in front of the entrance is the only danger to shipping, but it is easily avoided in leading winds, by keeping along the land. Should a vessel be obliged to beat in, she should be careful not to touch this rock.

Guaymas is surrounded by high mountains, which make it extremely hot

in the rainy season. The same fevers are prevalent here as at San Blas and Mazatlan.

The following remarks on Guaymas are by Lieut.-Com. S. O. Woolridge, U.S. *Spy*:—"I arrived at Guaymas on July 21st, 1847, in four days from Mazatlan. During this passage we experienced *strong currents running to the N.W.*,* from a mile to a mile and a half an hour. They were much influenced by the wind, which, from the 19th to the 21st, was south-easterly and southerly. Current also runs with more force on the eastern shore, which side we kept.

"Cape Haro can be easily distinguished by the Tetas or Paps, which resemble the tents of a goat; they are to the northward. The island of St. Pedro Nolasco is just visible from the deck to the N.W. The land on the Yaqui shore is high and peaked; keeping this broad on your starboard bow, steer to the northward of a deep bay, where the land breaks off, and you will soon perceive the island of Pajaros, which is at the entrance, or facing Guaymas. The water is deep all along the island of Pajaros; that is to say, 4 fathoms, so close as to throw a biscuit on shore.

"A large ship will have to anchor soon after passing Pajaros; that is, abreast the Morro, in 5 fathoms. A small ship, and those of *Carysfort's* class, can anchor inside the isles of Ardilla and Almagro, in 4 and 3½ fathoms, just inside them; and in 3 fathoms, as far in as the point off the town. You may go close to either of the Isles Ardilla or Almagro, in 3 and 3½ fathoms.

Water is very difficult to be got; it is to be obtained by sending about 4 miles for it, or it can be purchased; but, owing to its having to be brought in on mules or in carts, the price is very high. I wanted 12 tons, which I found could not be obtained for less than 30 dollars, which would be nearly 10s. a ton.†

Of the shores of the gulf northward of Guaymas, our knowledge is still imperfect, but its nautical interest is of the most unimportant character. Besides the old Spanish charts, we have the later U.S. Senate report (1852) of the exploration made in the U.S. transport *Invincible*, Capt. Wilcox, as

* This will demonstrate that these currents are greatly, if not entirely, dependent on the wind, for we are told by other commanders that there is a *great outset* from the gulf, which must be guarded against in crossing the entrance.

† *Hermosillo*, which is the chief town of this part of Sonora, is 84 miles by the road North of Guaymas, which may be considered as its port. But the trade of each is not considerable, for Dr. Bell says that three merchant vessels in 1867 glutted the markets of both places. *Hermosillo* is a most curious and interesting old town, resembling what a large Moorish town in Spain was in the seventeenth century. Its situation is singular: it is built in the gap which the Rio Sonora has cut through the western range, and which rises high all around it. It is the focus of an important silver mining region, and possesses a mint for coining dollars.

North Pacific.

related by Lieut. George H. Derby. We have included all of nautical interest in this report in the subsequent descriptions.

Proceeding northwards along the coast of Sonora, at 4 leagues from Guaymas, is an excellent harbour, called *Puerto Escondido*, the small islands of *San Pedro Nolasco*, *Tortuga*, *San Pedro*, and in lat. 29° the *Isla del Tiburon*.

Tortuga is about 6 miles in length, and, like most others in the gulf, appears rocky, barren, and uninhabited by animals.

Tiburon has a rugged outline. It has long been known as the abode of the Ceres Indians, a small tribe of about 500, who are represented as extremely hostile, and invariably opposing any attempt at landing; they are said to be armed with poisoned arrows. A rich bed of pearl oysters is said to exist between this island and the coast of Sonora, and there are accounts of rich gold mines upon the island; but as no one is ever known to have landed there, it is difficult to understand how the fact was ascertained.

San Estevan or *Bruja Island*, to the S.W. of Tiburon, presents an exceedingly wild and sterile appearance, resembling the generality of the gulf coast on the California side. The appearance of the water between this island and that of St. Sorento led us to suppose that we were on soundings, but on trying the deep-sea lead we found no bottom at one hundred fathoms. (*Derby.*)

Tiburon forms with the coast a narrow and dangerous channel (*el Canal Peligroso*), which is terminated by the islet *De los Patos*. All this part of the province is barren, and only a few Tépacas Indians are to be met with.

The rivers do not reach the coast at all times, for a large portion of their waters is diverted for irrigation. At 35 miles North of Tiburon is the place called *La Libertad* or the *Puertecitos*, from which there is a road to Altar.

To the North of the *Rio de la Concepcion de Caborca* is the small bay of Santa Sabina and the island of Santa Inez, the Rio de Santa Clara, and the watering-place, *Los Tres Ojitos*. As far as the *Rio Colorado*, at the head of the gulf, the coast is barren, and very low. The wind perpetually raises clouds of the fine sand which composes it.

The head of the Gulf of California has evidently been formed by the detritus brought down by the singular but almost useless river, the Rio Colorado. There is no doubt but that it is subject to very great changes,* and there-

* The head of the gulf probably was much further northward in earlier ages of the world's history. For at from 80 to 150 miles N.N.W. from the present mouth of the Colorado is an area called the Salt Lake. This is shown by barometrical observations to be below the sea-level. It is now a dry plain of alluvial formation, with a beach line distinctly traceable. Mr. W. P. Blake, of Washington, explains its formation by inferring that the silt or matter brought down by the river has filled up the interval, and shut it off

fore no directions can be useful for any period. Lieutenant Derby thus describes it :—

A large island close to the California shore, in lat. $29^{\circ} 3'$, long. $112^{\circ} 51'$, was named Smith's Island. This island is about a mile North of Angeles Bay, a small indentation of the coast about 4 miles in width, slightly open to the eastward, with a sandy bottom in about 10 fathoms water. The adjacent country is extremely wild and rugged. The hills are covered with huge boulders. There are three springs of slightly brackish water at the foot of the highest hill, and a bed of most excellent oysters is exposed at low tide. The water may be found by noticing the reeds which grow about it, and which are the only green things in the vicinity. The bay is apparently well known to the people inhabiting the interior, as there were many traces of old encampments, &c. There are plenty of turtle, and in certain seasons of the year there must be great quantities of water, but in December, 1850, all was dry and parched. There are several sunken rocks in the entrance. Tides rise and fall about 15 feet.

Clarence Island or the *Ship Rock* is a remarkable rock, which at a distance has the appearance of a ship with all sail set. It is about a mile in circumference, about 200 feet high, and perfectly white with guano. It is probably the same as Hardy's Clarence Island, but is 20 miles West of the position he gives to it.

Montague and *Gore Islands* are to be readily recognized from Hardy's description. They are low, flat, and sandy, and are separated by a very shallow channel a mile wide. The country here is covered with dwarf reed and coarse grass. Thousands of trunks of trees lie scattered over its surface as far as the eye can reach, showing that it must be entirely overflowed in the season of the freshets.

The **RIO COLORADO** is the most important river of this region, and is one of the most singular in the world. The real character of its upper course has only been known within a recent period. It divides the State of California from the territory of Arizona; and at 70 miles in direct distance from its mouth is the junction of the *Gila River*, a most important stream which drains the rich mining districts of S.E. Arizona. On the South side of the junction is *Arizona City*, "a small place with a big name," and on the North side is *Fort Yuma*, the first station of the Colorado Steam Navigation Company. This company has three steamers and three barges of 70 and 100 tons burthen. The condition of the river may be judged of when it is stated that these craft draw *one foot* when light, and *two feet* when loaded, and never travel by night. The river is navigable to *Calville*, in lat.

from the gulf. The water was then evaporated by the dry winds of that desert region; and again, the water of the Colorado, at the time of freshets, overflowed and run back into the desert for many miles.

36° 13' N., a distance 612 miles by the river from its mouth, and 400 miles S.S.W. from the Salt Lake City. The summers here are intensely hot (rising to 126° in the shade), but the winters are mild, the lower extreme being 34°. The average amount of rain in 4 years at Fort Yuma, between 1857—1867, is only 4.01 inches per annum.

Above Calville the Colorado runs through that most wonderful natural phenomenon—the Grand Cañon, a gorge hundreds of miles long, evidently cut by the river through the strata to a depth of 6,000 and 7,000 feet, being scarcely broader at the level of the river than it is on the upper surface of the plain. It is this unexampled singularity which renders it quite useless to man, either for means of transport, or for fertilizing the country through which it flows.*

Lieut. Derby says of it (1851):—

The bar at the mouth of the Colorado is about 10, possibly 15 miles in width; the soundings upon it are from 10 feet to 4 fathoms; it is a very loose, muddy bottom, and with a stiff breeze a vessel could force her way over it, even if drawing a foot or more than the lead would indicate. The distance from the junction of the Gila and Colorado to the mouth of the latter, by water, is about 104 miles, owing to the many bends of the river, though the difference of latitude is but little more than half that distance.

The navigation of the Gulf of California presents none of those difficulties which we had been led to anticipate. The wind we found invariably from the N.W., which, at this season of the year, is its prevailing direction; it is only during the months of June, July, and August that the gales from the S.E. are prevalent; except in Whale Channel we noticed none of the strong currents so frequently mentioned as existing in the Gulf.

It would be difficult to mistake the entrance to the river, it being in fact the head of the gulf, which gradually narrows from 40 to 3 miles when it is joined by the river, whose turbid stream discolours the gulf for many miles to the southward, in soundings of 12 and 14 fathoms. On the Sonora coast, however, exists an indentation some 15 or 20 miles in depth, called by Hardy Adair Bay; the shoals of this can be seen from the mast-head, a view from which would prevent one falling into the error which he did of supposing it a mouth of the Colorado. The angle at the junction of the slough and the main river is called Arnold's Point, and from the mouth of the river (after crossing the bar) to this point, the channel varies in depth

* In Dr. Bell's "New Tracks in North America," 1869, an account is given of the passage down this gorge by James White, a miner. Fleeing from the Indians, his party (who were all lost but himself), in August, 1867, entered the canon on a raft, and after a frightful journey of fourteen days (of which six consecutively were without food), he reached Calville in a dreadful state. This thrilling narrative is found in Chapter XIII of the above work, and it is probably the only exploration that has been, or will be, made of this ravine.

from 15 to 30 feet, at ordinary high tide, and may, as we have practically demonstrated, be ascended by a vessel having a draught of 8 or 9 feet, by taking advantage of the flood, which has a velocity of from 3 to 5 miles per hour. It is impossible to sail up, however, for although the river varies in width from 3 miles to 600 yards, the channel is narrow and the navigation elsewhere obstructed by the numerous sand bars. The proper method, after passing Gore and Montague Islands through the western channel of the river, is that which we adopted, to drift with the flood tide, keeping close to the highest bank, sounding continually, and anchoring before the time of high water: in this way we progressed slowly but steadily, making, perhaps, 4 or 5 miles per day, until we arrived at the point where we finally landed the stores, which I have named, "Invincible Point."

The mouth of the Colorado has evidently greatly changed since Hardy's visit in 1826. The ebb tide was observed to run at $5\frac{1}{2}$ miles an hour, and the flood comes in with a "bore," a bank of water 4 feet high extending clear across the river, and occurs daily till near neap tides, proving the assertion of Hardy, that "*there is no such thing as slack water in the River Colorado.*"

There is but little water now in the entrance of the Colorado from $2\frac{1}{2}$ feet to $1\frac{1}{2}$ fathoms, in January 1851.

The time of high water at Arnold's Point, at the junction of the Colorado with the Gulf, is 3^h 20^m p.m., and the ordinary rise about 12 feet, but during the freshets is apparently at least 15 feet higher. The tidal motion ceases at about 40 miles from the mouth. Near the mouth there is no vegetation, but higher up the shores are thickly lined with cane, rushes, small willows, &c., and the interior country with a coarse sharp grass. Invincible Point, the S.E. point of the Colorado Mouth, is in lat. $31^{\circ} 50' 26''$, long. $114^{\circ} 46' 43''$.

The Western Shore of the Gulf is as yet but little known. As was above stated, it is now entering on a new phase, as it has recently become the property of a Land Company, which may develop its resources, but this is in the future.

The northern limit of the purchase above alluded to is a line on the parallel of lat. $31^{\circ} N.$, which strikes the western coast to the northward, the watering place of *San Felipe de Jesus*. At 25 miles southward of this is *San Fermin*. Then follow *Santa Isabel*, *La Visitacion*, *San Estanislao*, the *Bay of San Luis de Gonzaga*, *San Juan y San Pablo*, *Los Remedios*, and the *Bay de los Angeles*.

Angeles Island, or *I. del Angel de la Guardia*, lies off this part of the coast. It is 30 miles long, but narrow. It is mountainous, rocky, and uninhabited. To the South of it are three small islands, under the name of *Las Arrinas* (or *Animas*). They are composed of coarse clay slate, coloured trap, and trap tuffa, and covered with cacti. Immense quantities of seals are found upon these, as well as most of the other islands of the gulf. I named these

Allen's Islands. They are in about lat. $28^{\circ} 55' N.$, and the soundings in the vicinity from 4 to 17 fathoms.

Angeles Bay is abreast of the South end of the island. It was visited by Capt. Wilcox, U.S.N., in 1851, as stated on page 131. At low tide Lieutenant Derby noticed several sunken rocks at the entrance, which they had not perceived in coming in. The rise and fall at Angeles Bay is about 15 feet. Its lat. is $29^{\circ} 5' N.$, long. $113^{\circ} 25' 30'' W.$

Abreast of Angeles Island, at 9 leagues from the shore, was the mission of *San Francisco de Borja*. To the South the islands of *Sal si Puedes* (get out if you can), *Las Animas*, and *San Lorenzo*, present a very dangerous passage. To the South of the Cape de las Virgenes are seen the *Bay of Santa Agueda*, *Galapagos Island*, the *Cape and Island of San Marcos*, which, with the islands *Tortuguitas* and Cape San Miguel, form the *Bay of Moleje*.

Opposite the Island of San Marcos, but 6 leagues inland, there was the mission of San Ignacio. That of Santa Rosalia lies half a league from the sea, on the banks of the *Rio Molejé*. This point is easy to be found. In approaching it a small hill will be seen, called the *Sombrerito*, having the form of a hat. The bay is shallow, and boats of 15 or 20 tons can only enter it. Some pearls are found, and on the banks of the river some fruits and grain are, or have been, produced.

MOLEJE.—This is an extensive bay, which runs to the S.S.W., between the above river and Point Concepcion on the East. The following observations on it are by Lieut.-Com. S. O. Woolridge:—"Point Concepcion is difficult to make out, when you have about a dozen of the same kind within a few miles of each other. However, the best marks I can give are some table land, which is very remarkable, and is rather to the right of Molejé village. Keep this about two points on your starboard bow, and you may stand in until you discover some sandy islets, which are off a point called Punta Ynes. When you are East and West with them, you will be distant from them about 3 miles. After passing these islets, then steer South and S.S.W. until you make out the Pyramid Rock, spoken of by Captain Hamilton. This rock is called *Sombrerito*, or Little Hat. I think it bad to call it Pyramid Rock, as there is a point which, in standing in, may be easily mistaken for it, resembling also a pyramid; but the rock is a pyramid fixed on a round pedestal like a fort. Another good way of making out this place is, when the wind is fair, to keep Tortuga Island, about 20 miles distant, bearing about N.W., and steer in S.E. till you make out the sandy islets, and proceed as above. There is a passage between the islets and the main land for small vessels, but, though very inviting, should not be attempted. I tried it, but getting into $2\frac{1}{2}$ fathoms, I put about as quick as possible. My anchorage marks in Molejé Bay were as follow, in 5 fathoms:—Point Concepcion, N. $84^{\circ} E.$; Tortuga Isle, N. $4^{\circ} W.$; Lobos Isle, N. $2^{\circ} E.$; *Sombrerito*, S. $67^{\circ} W.$ (Pyramid Rock of Captain Hamilton); Equipalito, S. $22^{\circ} W.$

(Rock on South side of entrance to the river); Punta San Ynes, N. 10° W.

"This is very close in, but I wished to facilitate the watering; about half a mile further to the northward, in 8 fathoms, is a very good berth. In going into the bay after making out the Sombrerito, if you wish to go close in, take care not to bring the Sombrerito at all on your starboard bow; that is do not open the mouth of the river, as by sounding I discovered a rock with only one fathom on it; it is on a sandbank with 3 fathoms all round it, about three-quarters of a mile from the shore; but the rock itself has only one fathom. It lies with the entrance of the river open, directly between the Sombrerito and Equipalito Rocks, distant from one half to one mile off shore. The report of the facility of watering is very delusive and uncertain.

"In the first place I cannot think it possible to water out of the river, as it is salt for at least 2 or 2½ miles, and a great portion of the time boats could not possibly get up so far. I was there, fortunately, when the moon was nearly full, and the water was only low between eleven at night and four in the morning, so that I was enabled to water about eighteen hours out of twenty-four, and though I had but one small boat (23-feet cutter), I managed to get 12 tons in two days. She had to go 1½ mile up the river, to Padras. The water is delicious to drink at the stream, but it is so very low, and our water, after being a day or two on board, became so black, and smelt so strong of decayed vegetable matter, that though it improved by keeping, it served chiefly for cooking and washing."

From Molejé Bay to Loreto there is always, near the land, from 20 to 30 fathoms, and the coast offers good anchorages: the Points of *Santa Teresa*, *Punta Colorada*, those of *Pulpito de San Juan*, the bay of that name, that of *Mercenarios*, *Point Maglares*, and *San Bruno Cove*.

Mangles Road is 3 miles to the northward of San Bruno Cove, the landing place is in lat. 26° 16½' N., long. 111° 22½' W., under the shelter of Mangles Point. It is open to the East, and at its South side is a rock *awash*, 2 miles S.S.E. from Mangles Point, and 1 mile off shore. The bay is famous on the coast for its valleys, well supplied with wood of a superior quality.

At 3 leagues to the North of Loreto the little island of *Coronados* offers shelter from the N.E. Near the mission there is a depth of 4 fathoms, and under the lee of the *Island del Carmen* 13 to 16 fathoms.

Lloretto or Loreto.—The anchorage at Loreto is pointed out by the church and a clump of palm trees, and it may be distinguished at a distance by a very lofty peak, surrounded by smaller hills.

This mountain, called *El Cerro de la Giganta*, is the highest in Lower California. Its height above the sea level is 4,560 feet, according to trigonometrical measurement; it is of volcanic formation, as is all the rest of the chain which runs through the peninsula. The anchorage of Loreto is open to the winds from North, N.W., and S.W. When they blow very strongly, the

ship must get under way to escape being driven on shore. If she is of small draught, she may make for Puerto Escondido, 14 leagues to the South.

The mission of *Real de Loreto*, opposite Carmen Island, was the capital of Lower California; but it is so much decayed that the authorities were transferred to the *Real de San Antonio*. The presidio, the mission, and the church, are fallen to ruins. These buildings, very substantially built by the Jesuits, were intended to serve, in case of attack, as an asylum to the inhabitants. They are surrounded by a thick wall, which turns the waters of a torrent which comes from the mountains; and which, several times, washed away the houses and the vegetable earth. The church, for a long time after its decay, contained many pictures, silver vessels, and jewels of considerable value, which, though left quite open, was considered safe from spoliation. At Loreto water is generally scarce; and that from the wells is brackish and unwholesome.

Carmen Island lies in lat. $26^{\circ} 10' N$. Dr. Bell says it is worth a visit. It belongs to the American Land Company, and of its huge estate, this is its richest prize. Close to the shore, but partitioned off from the sea by a narrow strip of shingly beach, over which the water never flows, is a lake covering an area of about six square miles, the bottom of which is covered with pure white crystals of salt—chloride of sodium—without any admixture or adulteration in the shape of sand, algae, or other salts. Usually no water covers this area, and the salt has only to be raked up, packed in large sacks, and shipped to San Francisco. Here it is ground and sold, without any purification, as the finest table salt. Holes have been dug 10 feet deep through pure crystals of salt. Fine volcanic mountains form a semi-circle around this lake, and when it rains the drainage from them flows into this basin, and covers it to the depth of a few inches. It is supposed that the salt is thus washed down from some large natural deposits. There are, also, some fine beds of the long shelled oyster hereabouts which are shipped to San Francisco.

Salinas Bay was surveyed February 4th, 1849, in the *Herald*, by Captain Kellett, R.N. He places the head of it in lat. $25^{\circ} 59' 34'' N$., long. $111^{\circ} 5' 45'' W$. It is about $3\frac{1}{2}$ miles wide between Moro and White Points, and 2 miles deep. Fish and turtle are to be got at its head.

To the South of the Isle Carmen are the *Islands Catalana*, three leagues in length, *Montserrat*, *Los Danzantes*, the *Pearl Banks*, &c., of which the chart gives the best guide. They were partially examined in February, 1849, by Captain Kellett, R.N., in the *Herald*. The only points visited by shipping are the harbour of *La Paz* and *San José del Cabo*.

Catalana Island is about 7 miles long. Its North end is in lat. $25^{\circ} 42'$, long. $110^{\circ} 47'$. It is very abrupt, narrow, and has deep water close to. Midway between it and the coast is *Montserrat*, of small extent; and at 2

miles North of it are some rocky islets outside, or to the North of which is a *dangerous rock* only 2 feet above high water.

San Josef Island is 40 miles South of Catalana. It is 3 leagues long, and separated from the coast by a deep channel 4 miles wide. *Amortajada Bay* is on its S.W. side, and is the principal anchorage. It is an anchorage open to the S.W. Its N.W. point, according to Captain Kellett, is in lat. $24^{\circ} 54\frac{1}{2}'$ N., long. $110^{\circ} 35' 23''$ W. Fresh water is to be got, in the season, from a rivulet at its S.E. end. The anchorage is sheltered. San Francisco Island lies off the South end of San Josef.

Espiritu Santo Island is about 20 miles S.E. of San Josef. It projects northward from the peninsula which forms the bay of La Paz, being separated by a channel 3 miles wide, which has a *sunken rock* in the centre. There are some islets off its North end, but they are not well known. At the S.W. end of the island is *San Gabriel Bay*, sheltered from northward and eastward, lat. $24^{\circ} 25'$ N., long. $110^{\circ} 19'$ W. There is anchorage in 10 fathoms, but it suddenly shoals from this. *Port Ballena* is a mile to the North of San Gabriel. In its entrance are *Gallo* and *Gallina*, two islets, between which is good anchorage.

LA PAZ BAY is an extensive indentation, running southward for 20 miles, and about 12 miles wide at the entrance. At its head is the town of La Paz, and on its eastern side, about 5 miles from *Point San Lorenzo*, the N.E. entrance point, is the island of *San Juan Nepomuceno*, $1\frac{1}{2}$ mile long, but narrow. It is connected with the land at its North end by a shallow flat, but it forms a bay, opening southwards, called *Pichilingue Bay*. This harbour is about one-third of a mile broad, and has a depth of $4\frac{1}{2}$ to 6 fathoms, affording excellent shelter. Very fine pearls used to be found here. The S.E. point of Nepomuceno Island is in lat. $24^{\circ} 15'$ N., long. $110^{\circ} 16'$ W., according to Capt. Kellett.

La Paz, where Cortes landed, May 3rd, 1535, is in lat. $24^{\circ} 10'$, long. $109^{\circ} 45'$. In coming here vessels anchor in *Pichilingue Bay*, above mentioned, to the East of the Island of *San Juan Nepomuceno*, in from 5 to 9 fathoms, and at 2 leagues' distance from the houses. The population of La Paz consists of about 400 people, the greater part descended from foreign seamen. This is the only town of Lower California.* It is a beautiful little place, nestled amongst palm trees at the extremity of the inlet, surrounded by bold mountains of variegated volcanic rock, so common along the

* The Port of La Paz was named at the time of its discovery *Bahia de Santa Cruz*, afterwards it was called under the name of *Porto del Marquez del Valle* (Cortes), and lastly that by which it is now known. It was during his stay in this bay that Cortes received the unpleasant news of his disgrace, brought on by the jealousies which his great services raised, and that, not less painful, the news of the arrival of the first Mexican viceroys, sent to replace him in the command.

coast of Lower California. Outside is a pearl fishery, at which numerous Yaqui Indians are employed; they bring up the shells from a depth of 8 fathoms. Vessels from San Blas, Mazatlan, and Guaymas, often come to purchase shell.

A vessel anxious to keep on the coast of Mexico, or in its neighbourhood, during the bad season, cannot do better than run over to the Bay of La Paz on the West shore of the Gulf of California, and but little to the North of Mazatlan. This splendid harbour is formed by the main land of Lower California on the starboard hand going in, and a long chain of islands with shallow passages between on the port hand. The most eastern island is Espiritu Santo.

North end of Espiritu Santo, lat. $24^{\circ} 36' N.$, and long. $110^{\circ} 22' W.$, with a large rock due North of it 5 miles.

In approaching this bay from Mazatlan the Island of Cerralbo will be first made, high and mountainous; North end lat. $24^{\circ} 23' N.$, long. of South end $109^{\circ} 45' W.$ From it Espiritu Santo will be seen bearing about W. by N. The bay is at least 30 miles deep, and for the first 20 miles a deep bold shore on either hand, no bottom with 20 fathoms close to the islands. Large vessels anchor under the Island of San Juan de Nepomuceno; but small ones anchor within half a mile of the village of La Paz. Fish, water, turtle, cheese, and fruits are to be obtained here; and cattle also in the wet season when pasturage is to be found on the coast. Snakes are very numerous and venomous.

Capt. Richmond says (1854) that the lead is not to be trusted in La Paz Bay, as the water shoals very suddenly from 20 fathoms into danger on its western shore, as well as against the islands to the East. The channel between Espiritu Santo Island and Pt. S. Lorenzo is very narrow, not more than two or three ships lengths' wide, and there is but one channel, not two, as marked on the chart.

At La Paz, the Rio Yaqui, and Guaymas, eight or ten small vessels, of 20 to 40 tons, are fitted out for the pearl fishing. The divers are all Yaquis Indians. The fishing begins in May, and ends in October. The principal pearl banks in the gulf are in the Bay of La Paz and near Loreto, the S.W. point of the Isle Carmen, Fuerto Escondido, Los Coronados, Los Danzantes, San Bruno, and S. Marcos Islands.

Cerralbo Island lies to the S.E. of La Paz Bay, as above stated. Captain Richmond says that there is a *rock* about 6 miles N.W. of the North end of it. According to the charts there is a rock, 10 or 12 feet high, at 9 miles N.W. of the island, and another *sunken rock* about midway between, called the *Queen Rock*. Besides this another breaker is shown, so that with all these reports, which have not been properly verified, great caution is necessary.

BAY OF SAN JOSE del Cabo* is open from the South to N.N.E., and is very dangerous, when, in bad weather, the winds prevail from this quarter; the bottom being bad holding ground, and the anchorage so near the shore, that there is no chance of getting off with the wind on shore. It follows, therefore, that this bay ought not to be frequented, except from the end of November until May, the season when winds from West and N.W., and fine weather, prevail throughout the gulf, as well as on all the Mexican coast. It is at this period that it is visited by the whalers and merchantmen trading to Lower California; but these latter prefer the port of La Paz, before described, which is more secure.

It was visited by H.M.S. *Herald*, in June, 1848, and Capt. Henry Trollope, R.N., thus describes it.

The Bay of San Jose is an indifferent roadstead at the extreme of the Californian Peninsula. It is entirely exposed from N.E. by the E. to S.S.W.; the water is deep even close to the shore, and a hole having 40 or 50 fathoms exists in the best part. It is, however, a convenient place for obtaining water, as well as for fresh beef and vegetables. Fruit, such as figs and oranges, milk, Mexican cheese, and one or two other articles may be procured from the village, which is about three-quarters of a mile from the stream. One of the marks for the bay will be the high range of hills running to the N.E.; the remarkable thumb peak of San Lazaro standing up like a pinnacle is the highest of the range, while the valley of the river is clearly defined between this range on the left and a much lower range of pinnacles, craters, and flat table-lands on the right. The coast for 5 or 6 leagues to the N.E. is free from danger. Running along the coast from the eastward, Punta Gorda (the northernmost point of the bay) is too remarkable to escape notice—a flat white hill of moderate height, perhaps 150 or 180 feet high, with several pyramidal hills to the left, particularly a group of three in one with a flat-topped crater-like hill or truncated cone near it, and a flat level plain with a single conical hill in it to the right; the long playa, or sandy beach, will then be seen, running along which you will soon distinguish the stream and a flagstaff on a slightly elevated mound. The coast may in any part be approached without danger, having 5 or 6 fathoms close-to, but deepening very rapidly. To avoid letting go your anchor in the 50-fathom hole, keep the flagstaff open to the westward of the high peak of San Lazaro, or thumb, as we call it, the latter bearing N.W. by W., when a vessel may anchor in 13 to 15 fathoms, soft mud, three-quarters of a mile

* At the mission of San José in the southern part of the peninsula, the learned Abbe Chappe d'Auteroche died, whom the Royal Academy of Sciences sent to observe the transit of Venus in 1769. He accurately determined the position of Cape San Lucas, which served as a landfall and departure for the ships for China and Europe.

from the shore. The river is 50 yards to the left of the flagstaff, and at low water, when there is but little surf on the beach, affords an excellent supply. It is, however, liable to interruptions; strong N.W. breezes raise a heavy surf on the beach, rendering landing somewhat difficult. However, with a party on shore filling and a hauling-line for the casks, we completed very expeditiously, getting forty tons on board in thirty hours. The sea at high water percolates through the sand, rendering the water brackish and unfit for use. This can be remedied by going higher up the stream, but the labour is of course more. Horses are good and easily obtained. There are no remains of the Franciscan Mission of San José, the origin of the place; and the village is but a poor straggling place, which, I believe, almost grew up during the war with America. The flagstaff is in lat. $23^{\circ} 3' 15''$ N., long. $109^{\circ} 37' 53''$ W., variation $2^{\circ} 28' 53''$ easterly. Off a rocky cliff between Capes Palma and Pafia, there is a shoal about one mile off the shore, which we did not examine. The cliff is in lat. $23^{\circ} 26' 53''$ N., long. $109^{\circ} 23' 30''$ W.

The Bay of San Lucas offers safe anchorage and shelter from westerly winds, but is exposed to a very heavy and most dangerous sea from the S.W. The soundings are very irregular, and the anchorage, by reason of its great depth in the centre, is completely a lee shore.

The village consisted of four houses at the time of Captain Sir Edward Belcher's visit, and water, wood, cattle, cheese, oranges, and pumpkins were obtained. The water, which is procured from wells, is sweet when drawn, and very bright, but is impregnated with muriate of soda and nitre, which pervade the soil. It consequently soon putrefies on board. The country about Cape San Lucas is mountainous, and probably granitic. The plains, as well as the hills, are very abundant in cacti.

The navigator has no hidden dangers to fear; all are above water. After rounding the Frayles from the westward, he may safely stand for the houses, dropping his anchor in 15 fathoms. The bad season is supposed to commence in June, and terminates on the 1st of November.

A word of caution in anchoring here may be given. The *Sulphur*, on shortening sail in coming to, had 10 fathoms, and immediately after they had no bottom with 88 fathoms, just as they were about letting go the anchor. This shows the necessity of keeping the lead on the bottom before letting go an anchor, or you may lose it.

CAPE SAN LUCAS, the southern extremity of the peninsula, is in lat. $22^{\circ} 52'$ N., long. $109^{\circ} 53'$ W. It gradually, though not very regularly, descends from the very broken and uneven range of mountains which extend from the N.W., and terminates in its South extremity in a hummock of low, or very moderately elevated, land, of a rocky, sterile appearance.

The coast between Cape San Lucas and the Island of Santa Margarita, a distance of 130 miles, is in many parts composed of steep, white, rocky

cliffs; the country rising with a very broken and uneven surface to the ridge of stupendous mountains previously mentioned, and which are visible at a great distance into the ocean. The shores jut out into small projecting points that terminate in abrupt cliffs, and having less elevated land behind them, gives them at first the appearance of being detached islands; but on a nearer approach this does not seem to be the case. The general face of the country is not very inviting, being destitute of trees and other vegetable productions.

After having doubled Cape San Lucas, and proceeding along the coast, at a short league from it, you find the mission of *Todos los Santos*, which a few years ago still contained a few Indians. There is an anchorage, with a small rivulet where water can be procured, and also provisions could be had.

At the parallel of 24° the mountains form a promontory, surmounted by three peaks, the truncated summits of which resemble tables, and which are, from this reason, called *Las Mesas de Narvaez*.

From this point the coast runs nearly N.W. to the large island of Santa Margarita, forming the South entrance of the immense bay of La Magdalena.

The **GULF OF MAGDALENA** is an extensive inland sea, whose existence was scarcely suspected in Europe prior to the visit of Capt. Sir E. Belcher, in 1839, when he minutely surveyed it, and the fine chart recently published is the result of that survey. Nearly at the same time the French frigate *La Venus*, under Du Petit Thouars, also surveyed its shores, and his plan, much less elaborate than that of our English hydrographers, forms a portion of the atlas accompanying the voyage.

It may properly be said to consist of two extensive bays: Almejas Bay to the S.E., and Magdalena Bay, the principal, to the N.W.

SANTA MARGARITA ISLAND, which forms the seaward face of the greater part of these two bays, is about 22 miles in length, by $2\frac{1}{2}$ in average breadth. In its centre it is so low, that at a distance it might be taken for two separate islands, the northern and southern portions being high land.

Cape Tosco is its S.E. point, and is bold-to. Four miles N.N.W. from it is Mount Santa Margarita, about 2,000 feet in height. To the East of it is the southern and intricate entrance to the two bays, through the *Rehusa Channel*, formed by the low sandy extremity of *Cresciento Island*, called *Sta. Marina Point*. The tide runs very strongly through this narrow channel, which is much embarrassed by sandy patches nearly and quite awash. No instructions can therefore be given for this, and will be scarcely ever required.

ALMEJAS BAY is about 12 miles in extent to the N.W., and is divided from the principal bay by a narrow but clear and deep channel, formed by

a sandy projection from the main land on the N.E. The extremity of this is called *Lengua* (Tongue) *Point*, and connected with it is an extensive low island, named *Mangrove Island*.

Southward of this sandy tract, the island of Santa Margarita is divided into two separate tracts of mountainous land by a low sandy neck. From the chart these points would seem to be the effect of currents, probably in combination with the geological changes hereafter noticed.

The North side of Santa Margarita Island, from this strait, trends nearly West, *true*, to its N.W. point, *Cape Redondo*, off which, to the distance of a quarter of a mile, some sunken rocks extend. About midway between its extremities, on the seaward face, is *Pequena Bay*, lying against the low tract previously mentioned; *Cape Judas* forms its N.W. extremity. Two species of tortoises are found on the island, one of which is very good eating, but the shell is worthless; the other, on the contrary, is unfit for food, but the shell is excellent and valuable.

The entrance to Magdalena Bay lies between Cape Redondo and *Entrada Point*, the southern point of the San Lazaro peninsula; like the opposite side, some sunken rocks lie off it. *Mount Isabel*, 1,270 ft. high, lies $3\frac{1}{2}$ miles N.W. of it. The width of the entrance is $2\frac{1}{2}$ miles, and the depth between the head 15 to 20 fathoms. At the foot of Mount Isabel, within the bay, a fresh-water marsh is marked on the chart. This is 3 miles within the entrance point. Five miles further on, on the N.E. face of the peninsula, and near to where the high land sinks to the long sandy neck connected with it northward, is the anchorage under Delgada Point; here Captain Belcher established his observatory. This is in lat. $38^{\circ} 24' 18''$ N., long. $112^{\circ} 6' 21''$ N. This was at the foot of a hill 600 feet in height, according to M. de Tesson's chart.

Northward of this the bay becomes very shallow, but has some deeper channels extending northward, separated by extensive shoals, which have received the names of *Du Petit Thouars*, *Tesson*, and *La Venus*, the French surveyors and their ship. As there can be no inducement whatever for entering them, no further notice here is necessary.

In the account of his exploration, Captain Sir Edward Belcher gives the following description of his progress:—

I was fully prepared to have found, as the name imported, an extensive bay, but on entering the heads, which are about 2 miles asunder, no land could be discerned from the deck, from N.W. to N.E. or East; and even after entering, it was quite a problem, in this new sea, where to seek for anchorage, our depths at first, even near the shore, ranging from 17 to 30 fathoms. However, as the prevailing winds appeared to be westerly, I determined on beating to windward, in which it eventually proved I was correct. About 4 p.m. we reached a very convenient berth in 10 fathoms, with a very sheltered position for our observatory. Preparations were im-

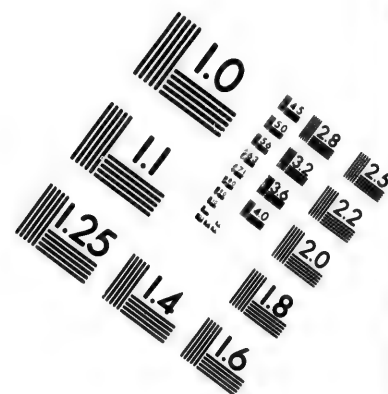
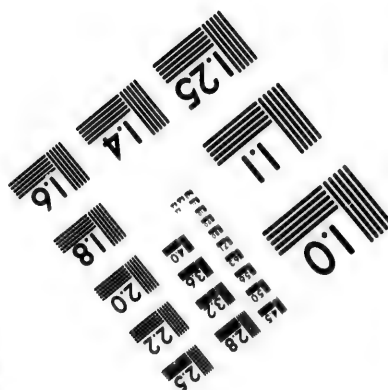
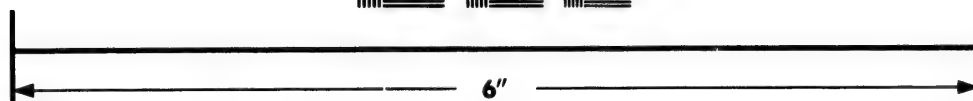
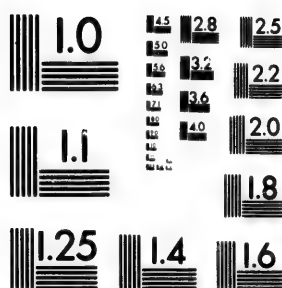


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mediately made for the examination of this extensive sea, or what I shall in future term the Gulf of Magdalena.

It is probable that this part of the coast formerly presented three detached islands, viz., St. Lazarus range, Magdalena range, and Margarita range, with one unnamed sand island, and numerous sand islets. It is not improbable that its estuary meets those from La Paz, forming this portion of Southern California into one immense archipelago.

The first part of our expedition led us up the northern branch of what held out some prospect of a fresh-water river, particularly as frequent marks of cattle were noticed. In the prosecution of this part of our survey, we noticed that the St. Lazarus range is only connected by a very narrow belt of sand between the two bays, and that the summits of some of these sand hills were covered in a most extraordinary manner by piles of fragile shells, which resembled those found recently in the gulf. At elevations of 50 and 60 ft. these minute and fragile shells were found *perfect*; but on the beaches, either seaward or within, not a shell was visible. This is the more extraordinary, as these sandy wastes are constantly in motion, and drowning everything else, and yet these shells are always exposed. On digging beneath them to erect marks no beds of shells occurred, nothing but plain sand. It was further remarkable, that they appeared to be collected in families, principally arca, venus, cardium, and murex; when ostrea appeared they were by themselves.

The cliffs throughout the gulf abound in organic remains, and I cannot but believe that the same cause has produced the above unaccountable phenomena, which I witnessed throughout a range of at least 90 miles.

Having explored the westernmost estuary, about 17 miles North of our observatory, until no end appeared of its intricacies, I resolved on attempting a second, which afforded a wider entrance, about 4 miles beyond the last, and it still offered ample scope for employment, the advance boats being at that moment in 4 fathoms, and distant heads in view; but finding no hope of reaching fresh water, I determined on adhering to its main outlines.

By November 9th (1839), we had reached the East end of the first gulf, and found the channel or strait connecting them not more than a quarter of a mile wide. I was sanguine in expecting that we should discover a safe channel out by the East end of Margarita, but I found that our boats, and, upon emergency, the *Starling*, might have passed out, but it was far too difficult and doubtful for the ship.

We had frequently seen, indistinctly, the outlines of very high mountains to the eastward, distant 50 or 60 miles; but on this day I could detect breaks which indicated water-courses between them, and could plainly follow out yellow breaks of cliffs as far as the eye could trace inland. I have not the slightest doubt that these estuaries flow past them, and pro-

bably to the very base of the most distant mountain, even into the Gulf of California. As I am informed that there are no fresh streams in the district of La Paz, and that similar esteros run westerly from that neighbourhood, it is not improbable that they meet. Although the solution of this question may not be commercially important, it is highly interesting in a geographical point of view.

After all the time expended (18 days) on this immense sheet of water, it will naturally be enquired, what advantages does the port offer? The reply is, at the present moment, shelter; and from several water-courses, which were nearly dry at the time of our visit, it is evident that very powerful streams scour the valleys in the winter season, which, in this region, is reckoned between May and October.

Fuel can be easily obtained in the estuary (mangrove).

As a port for refit after any disaster it is also very convenient; and for this purpose either our northern or southern observatory bays may be selected. The latter would afford better shelter; but the former is certainly more convenient, the access to it being entirely free from shoals.

In war it would be a most eligible rendezvous, particularly if watching the coasts of Mexico or California, as no one could prevent the formation of an establishment without adequate naval force, and the nature of the country itself would not maintain an opposing party.

The island of Margarita would afford an excellent site for a deposit for naval stores. Martello towers on the heads of entrance would completely command it, and, excepting on the outside, no force could be landed.

Water would doubtless flow into wells, of which we had proof in spots where the wild beasts had scraped holes; but from some (no doubt removable) causes, it was intensely bitter. There is nothing in the geological constitution of the hill to render it so.

The ranges of hills composing the three suites of mountains vary from 1,500 to 2,000 feet.

It is high water, full and change, in Magdalena Bay, at 7^h 35^m; rise 6 ft. 3 inches; variation 9° 15' E.—(1838).

From Entrada Point, the entrance to Magdalena Bay, to *Cape Corso*, which is at the North end of the elevated part of the peninsula, the distance is 9 miles, the breadth of the peninsula being here, on an average, about 2 miles.

From Cape Corso to the S.E. point of Cape Lazaro, the distance is 7½ miles, and the outer coast is formed by the long, narrow, sandy neck which separates the ocean from the entrance channels in the North part of Magdalena Bay, before noticed. This recedes 4 or 5 miles from the general line of the coast, and forms under Cape Lazaro, that is, to the southward of it, the *Bay of Santa Maria*.

Cape San Lazaro is in lat. 24° 44' 50", and is 1,300 feet in height;

hence the coast trends to the East and northward, and is steep to as far as the small bay (*Pequena Bay*) formed by Point Santo Domingo, in about lat. 26°.

The **ALIJOS ROCKS**, or *Farallones Rocks*, a cluster of four high, detached, and remarkable rocks, lie off 140 miles from this part of the coast. They are in lat. 24° 51', and long. 115° 47'. This position was accurately determined by Admiral Du Petit Thouars, who saw them for the second time. They will be again noticed hereafter, but, from their dangerous character, they must be alluded to here.

The coast beyond Point Santo Domingo trends to the N.W. for nearly 20 leagues, and then turns abruptly for 10 leagues to the S.E. to *Point Abrejos*, forming Ballenas Bay, in lat. 26° 42' N., long. 113° 34' W.

BALLENAS BAY is entirely open to the South. The soundings in the bay are quite regular, and extend a long way off shore, gradually decreasing to 3 fathoms, within a mile of the beach. With the strong coast winds a heavy swell sets in which causes a high surf along its shores. Whales of the "humpback" species make this a favourite feeding-ground, on account of the myriads of small fish found here. In the fine season, countless flocks of pelicans are seen making awkward plunges to catch their swimming food. At 15 miles eastward of Point Abrejos is a small estero.

The shores of the main land form the eastern boundary of the bay of Ballenas, where in lat. 26° 45', is found the entrance to a lagoon. It was first seen in 1857 by Capt. Pool, of the whaling barque *Sarah Warren*. In 1859 a whaling fleet first entered it.

The main branch of the lagoon is 2 miles wide, from shore to shore, at its mouth; running North for 3 miles, it then turns a little to the West, and doubles its width 6 miles from the bar; then gradually contracting, it comes to an end 8 miles further up, making the whole length 14 miles. A small branch, making from the South part of the entrance, and taking a more easterly course, runs through a low flat country, a distance of 12 or 15 miles, where it reaches a high table land. Another small estero, 15 miles further South, emptying into the sea, joins the southern branch of the main lagoon.

Near the head of this sheet of water are two islands, not over 4 miles in length and 1 in width. Both are very low. The upper island, on its highest part, has a growth of trees and low bushes, which gives it a pleasant contrast with the surrounding country. The southern island is quite barren; flocks of grey gulls, pelicans and cormorants, literally covered its shell beaches. Around the shores large numbers of huge turtle lay sleeping, and shoals of cowfish and porpoises played.

The face of the country, immediately in the vicinity of this inland water, on either hand, is low, quite level, and extremely barren. To the south-eastward rises a long table-land, to the height of a thousand feet or more,

North Pacific.

L

and then comes a wild mountain country as far as the eye can see. To the N.E. there is a belt of level land, that appears to extend through the peninsula to the Gulf of California.

The native name of this lagoon is *Susa Maria*. In a northerly direction from its head, distant 35 miles, rises a mountain, showing three swells of land at its summit; it is called *San Ignacio*, and at its foot is a mission bearing the same name. As you view this mountain from the coast, a still higher elevation is seen, standing alone, with rounded peak.

The entrance to this fine body of water is shoal, narrow, and extremely dangerous, on account of the strong currents running in different directions at different stages of the tide. Seven feet of water only is found at low tide, the rise and fall being about 6 feet. A heavy swell usually rolls on the bar at full and change of the moon, and it is only practicable for small vessels of light draught.

Point Abrejos, the N.W. point of Ballenas Bay, is quite low, and a small creek lies immediately North of it. An outlying reef of rocks extends 6 miles from the low land of the point. Abrejos ("Open-your-eyes") seems a fitting name for it. There is a good passage between it and the main, which may be used in case of necessity, although it is not generally known.

The coast northward of Point Abrejos is low near the shore line; but the beach fronting it, being composed of white sand, is seen a considerable distance at sea, contrasting with the brown clay cliffs and banks.

At 48 miles beyond Point Abrejos is *Asuncion Island*, lat. $27^{\circ} 8' N.$, long. $114^{\circ} 18' W.$, a small isolated spot, once the resort of vast herds of sea animals, and therefore was covered with inferior guano. At 8 miles further is another and similar island, *San Roque*, which is somewhat lower, but now unfrequented. The coast is thence clear for 40 miles to the north-westward.

SAN BARTOLOME' BAY, or *Turtle Bay*, as it also called by the whalers, lies to the South of Point San Eugenio. The bay is formed by a high range of loose cliffs on the North and a fine gravelly bay on the East, and a coarse sandy tongue connects a high peninsula, or island at high water, in its centre, forming a third southern bay. From this peninsula rocks extend northerly, partly under water, jutting into the heart of the bay, and forming a safe land-locked position, having 5 fathoms within.

The sheltered position where the whalers resort to cooper their oil is within a range of reefs which divides the bay, from seaward, into two parts. The anchorage taken by H.M.S. *Sulphur* was in 7 fathoms, sheltered from all but S.W. winds, but bad holding-ground. The surrounding land is high and mountainous.

The place of observation on the northern head of the bay is in lat. $27^{\circ} 40' N.$, long. $114^{\circ} 51' 20'' W.$ Wood may be procured here—in case of extreme necessity—by searching for low green bushes in the level land about the

shores; the roots are found running near the top of the ground 8 or 10 feet long and often six inches through; they burn readily, and produce the required heat.

In proceeding along the coast, the *Point San Eugenio*, which appears to form but one promontory with Natividad Island, lying off its western extremity, should be avoided.

The Island of Natividad lies S. $\frac{1}{2}$ E., distant 14 miles from the peaked mountain on Cerros Island. Its highest point is 700 feet above the sea; its length 5 miles, and not over 1 mile at its broadest part. It is extremely barren; neither shrub nor tree is found here; and it is only resorted to by large numbers of sea-fowl, as a breeding-place. From an islet off the N.W. end, there has been several cargoes of guano taken. Between Natividad and Point Eugenio (the S.W. point of the bay of San Sebastian Vizcaino), a reef, on which in bad weather there are heavy breakers, lies 1 mile to the eastward of Seal Rock; the channel between Natividad and the main, is not, therefore, so safe as is generally supposed, as in fine weather it breaks *only* at intervals.

Here, as at Cape San Lazaro, the whalers come, passing by night between the island and the main land, and anchoring against the point, which is very low. The passage between the island and this point is 7 or 8 miles wide. In approaching from the South, a tolerably high mountain called *Morro Hermoso*, shows itself to the south-eastward of the point. In coming from the North the islands of Cerros and San Benito will be a sufficient guide.

To the East of Point San Eugenio, the coast recedes considerably for the space of a degree of latitude, forming the great bay of Sebastian Vizcaino, in which, in lat. $28^{\circ} 56'$, is the small bay of *Pescado Blanco*, formed by a point 5 or 6 miles in extent, which projects to the southward.

CERROS or **CEDROS ISLAND** forms the most western side of the bay of San Sebastian Vizcaino. It is from 25 to 30 miles long, and its South point is in lat. $28^{\circ} 3' N.$, long. $115^{\circ} 11' W.$ It is an island of mountains throughout its whole extent, being a mass of high, abrupt peaks, the highest of which is 2,500 feet above the level of the sea, and may be distinctly seen, in clear weather, 60 miles. On a near approach, the sombre, barren appearance of all brought to view is anything but inviting. Many of the southern slopes present a dark red hue, interspersed with high variegated cliffs, that give a little change to the otherwise dull scene. On landing, one is at once fully sensible of the extreme dry atmosphere prevailing; still there must be, occasionally, heavy rains, producing mountain torrents.

On the N.E. side, about 3 miles from the extreme North end, a low sandy point makes out; to the southward of this is good anchorage during the prevailing coast winds. In a ravine near it is a small stream of fresh water; and likewise in several of the valleys leading from the shore line to the southward, water may be found within a mile of the beach. At one of these

places it is of excellent quality. The only practicable place, however, for a ship to obtain a large supply, is on the S.E. side, where there is a spring running among rushes at the foot of a high peak close to the shore.

Anchorage may be had off this spring, within 2 cables' lengths of the shore, in 20 fathoms of water; but a much better place for a ship to lie is 2 miles further South, off a low shingle beach.

A vessel can always find shelter from the N.W. winds on the South side of the island, in depths varying from 6 to 25 fathoms; these winds blow with the regularity of a "trade," from May to October, and the only precaution to be kept in mind in choosing an anchorage is to avoid fixed kelp. From October to May the winds are generally light and the weather delightful. Occasionally a strong "norther," or a light S.E. gale, blows the first part of the winter, and strong gales from the N.W. again set in about the 1st of May.

The San Benito Islands are three in number; the westerly one in lat. $28^{\circ} 12' N.$, long. $115^{\circ} 46' W.$ Two of these are moderately high, the middle one is quite low. They lay 15 miles to the westward of Cerros, and are only separated from each other by narrow passages of water, where boats may pass in safety, but not practicable for large vessels. The whole length of the three islands is not more than 10 miles. The western one is the largest. It is about 3 miles wide by 5 in length; the other two being less than half that extent. They are all very barren, affording neither wood nor water. The seal and sea elephant are the only animals found upon them.

Anchorage may be had on the S.E. side of the middle island, in from 10 to 20 fathoms water, but it is rough, rocky bottom, and affords poor holding ground.

In 1853 there was found on the S.W. end of the largest of this group, the remains of what was supposed to be a Japanese junk.

SAN SEBASTIAN VIZCAINO BAY,* an extensive indentation of the coast, lies within Cerros Island; but we have no nautical particulars of it, nor does it appear to possess any point of special interest.

Playa Maria Bay.—Northward of Pescado Blanco Bay, in lat. $28^{\circ} 55' N.$, long. $114^{\circ} 31' W.$, is *Santa Maria Point*, to the East of which is Playa Maria Bay, the limits of which may be taken as Black Point, about 6 miles S.E. by compass from Santa Maria Point. The bay is open, but clear; and inland, 2 miles from the head of it, is a hill called the *Nipple*, 1,132 feet high; and in the North part of the bay, on the coast, is what

* Sebastian Vizcaino, from whom this name is derived, was charged by the Spanish viceroy of Mexico, Don Gaspar de Zuniga, Count de Monterey, to survey these coasts. He set sail on this commission from Acapulco, May 6th, 1602, with four vessels, and among others discovered and named the Port of Monterey, which has remained the capital of this country up to recent times.

Captain Kellet calls *Station Peak*, 256 feet high. The variation line in 1847 was $8^{\circ} 44'$ E.

We have no particulars of the coast northward of this, further than what the Spanish charts afford us, until we come to *San Geronimo Island*, whose position is determined as lat. $29^{\circ} 48'$, long. $115^{\circ} 47'$. The next place is Port San Quentin.

PORT SAN QUENTIN is the name applied or chosen by Sir Edward Belcher for the harbour, which, under several Spanish and English charts, is called the Bay of San Francisco. This is much preferable, as the triple repetition of this name on this coast, applied by the Spaniards in honour of their patron saint, peculiarly so regarded by the navigators in the Pacific, has led to confusion. Captain Sir Edward Belcher's plan does not notice former synonymes, but we take the following extracts as applying to this spot:—

Cape San Quentin (or *Virgenes*), the western point of the Port San Quentin, is a long, low, projecting point of land. From this it takes a course of about N.N.W. for 8 miles, to Point Zuniga of Captain Vancouver. This portion of the coast consists of five remarkable hummocks, nearly of equal height and size, moderately elevated, with two smaller ones close to the water side, the whole rising from a tract of very low and nearly level land, forming a very projecting promontory. This was named by Vancouver, Point Five Hummocks, who says that it is as conspicuous and remarkable as any projecting point the land affords.

In coming down the coast from the northward, he had taken it for a series of detached islands.

The following are Sir Edward Belcher's observations on the port:—

"Port San Quentin does not afford anything equal to San Diego, but it is more secure when within, and might afford fresh water.

The sandy point on the West side of the entrance is situated in lat. $30^{\circ} 22'$ N., long. $115^{\circ} 56' 33''$ W. High water, full and change, $9^h 5^m$, rise 9 feet.

The whole coast is dreary, being either sand hills or volcanic mountains, five of which, very remarkably placed, caused one of the early navigators to call it the Bay of Five Hills. It is the Bay of the Virgins of the former, and Port San Quentin of the later Spanish surveyors.* As it appears engraved under the latter, on an extensive scale (which misled us and caused our touching), I have preferred that name for it.

The Island and Paps of Las Virgenes (Cenizas?) are situated to seaward, about 2 miles from what has been termed Observatory Peak in our plan.

* The North promontory is called, by Vancouver, Point Five Hummocks, as before mentioned. In his chart, the bay to the North of Point Zuniga, the North end of the promontory, is called the Bay de los Virgenes.

Point Zuniga, according to Vancouver's chart (he passed near to it), is the North extreme of what he called Five Hummock Point, and is 6 or 7 miles N.W. by N. of Cape San Quentin.

Cenizas Island, or *S. Hilario Island* or *Virgenes*, of Sir E. Belcher, lies off Point Zuniga about 3 miles. It is 4 miles in circuit, of a triangular form. Its western side is formed of steep high cliffs, but its N.E. and S.E. sides terminate in low sandy land, extending toward the continent.

CAPE COLNETT is about 30 miles northward of Cenizas Island. The interval forms the large bay of *San Ramon*, or *De los Virgenes*. Cape Colnett is very remarkable from its shape and appearance, as likewise by its forming a bay on its N.W. and another on its S.E. side. It was thus called by Vancouver, who says:—"This promontory bore a very singular character as we passed. The cliffs already described as composing it are, about the middle, between their summit and the water side, divided horizontally nearly into two equal parts, and formed of different materials; the lower part seemed to consist of sand or clay, of a very smooth surface, and light colour. The upper part was evidently of a rocky substance, with a very uneven surface, and of a dark colour. This seemed to be again divided into narrow columns by vertical strata. These apparent divisions, as well horizontally as vertically, existed with great uniformity all round the promontory."

From Cape Colnett to Point Grajero, the distance is about 50 miles. At 3 leagues S. by E. of Point Grajero, lie a cluster of detached rocks (*Solitarios Island*), about half a league from a small projecting point, that forms a bay or cove on each side of it.

At Point Grajero the coast takes a sharp turn to S.E., forming the *Bay of Todos los Santos*. Off the cape some rocky islets and rocks extend N.W. $\frac{1}{2}$ W., a league distant.

The coast northward of Todos los Santos Bay consists of high, steep, rocky cliffs, rising abruptly from the sea, and composing a craggy, mountainous country, extending in a N.W. by N. direction for about 10 leagues to *Point San Miguel*, when it assumes a more northerly direction, or N. by W. $\frac{3}{4}$ W., for 6 leagues. The shores still continue to be of steep rocky cliffs, which in general rise, though not very abruptly, to a very hilly country, remarkable for three conspicuous mountains, entirely detached from one another, rising in quick ascent at a little distance from the shore, on a nearly plain and even surface. The northernmost of these presented the appearance of a table in all directions from the ocean; the middle one terminated in a sharp peak; and the southernmost in an irregular form. The centre one of these remarkable mountains lies from Port San Diego, S.E. by S., distant 9 leagues, and, at a distance, may serve to point out that port. They were called the Tables, or *Mesas de Juan Gomez*.

At the South end of San Diego Bay is the boundary mark placed between

the Mexican and United States territories; and to the southward, about 8 miles off, is the small cluster called Los Coronados by Vizcaino, in 1602, but they were discovered by Cabrillo in 1542. They were named after one of the governors under Cortes.

The **CORONADOS**, belonging to Mexico, lie about 7 miles off the coast, and are a group of high, bold, and abrupt rocks and islets, of which the largest is 15 miles S. by E. from Point Loma, about 1½ mile in length, by one third of a mile in breadth. It is a wedge-shaped mass, 575 feet high, entirely destitute of trees, though in the rainy season it has abundance of gaudily-coloured wild flowers. There is anchorage about one quarter of a mile to the eastward of the islet, and but one difficult landing place. According to George Davidson, Esq., it is in lat. 33° 23' 46" N., long. 117° 13' 21" W.

On the West and N.W. sides of the islet, and about half a mile distant, lie two smaller ones, or rather two masses of bare rock, 50 feet high, the favourite resort of enormous sea-elephants. Excellent anchorage is said to be found in the vicinity. The smaller of the two prominent islets is 2½ miles N. 58° W. from the larger. It is a huge barren rock, with a very sharp summit.

In coming from the South this group affords a good mark for making San Diego, although before being up with them, Point Loma shows distinctly.

CHAPTER IV.

THE COAST OF CALIFORNIA.

IN the commencement of the preceding chapter, some remarks are given which may be taken in connection with the present subject. Until May 30, 1848, the countries respectively denominated Upper and Lower, or New and Old, California, were under one dominion, subject to the same laws, and under the influence of the same social system; intimately connected with each other morally, and having the same origin in a political sense, their histories may be considered as identical. When, however, a new order of things became established, and Upper California was ceded to the dominion of the United States, while the Lower Peninsula remained an appendage to Mexico, a wonderful change took place in the importance of these two territories, not so much arising from the change of masters as from the great event of the present century—the discovery of the gold produce of the basins of the rivers falling into the Bay of San Francisco.

The first discovery or exploration of this part of the American coast was made in 1540, under the orders of Don Antonio de Mendoza, the viceroy of Mexico, who despatched Francisco Vasquez Coronado by land, and Francisco Alargon by sea, in search of the supposed Strait of Anian, which, it was said, communicated with the Atlantic Ocean. Alargon reached the 36th parallel (South of Monterey), but was then forced to return. The same project was resumed in 1542 by Rodrigues de Cabrillo, a Portuguese in the Spanish service. He reached the latitude of 44°. His principal discovery was a projecting point in lat. 40½°, to which he gave the name Cape Mendocino, by which it is still known.

The Spaniards seem to have forgotten these discoveries, till, in 1578, Sir Francis Drake passed the Strait of Magalhaens, then scarcely known, and traversed the great ocean from South to North, reaching the N.W. coast of America in lat. 48° North. He then coasted the shore downwards, and discovered the harbour now bearing his name to the N.W. of San Francisco,

where he made some stay. He here formally took possession of the country in the name of Elizabeth, Queen of England, imposing the name of New Albion on it.

The expeditions of Drake, of Cavendish in 1587, and of Van Noort in 1598, gave rise to considerable jealousy with the Spaniards. They determined to colonize these coasts. Accordingly, Don Gaspar de Zuniga, Count de Monterey, the viceroy of Mexico, despatched Sebastian Vizcaino, in 1602, whose most northern important discovery was the harbour, which, in honour of the viceroy, he named the Puerto de Monterey. The Spaniards had found several missions on the Californian Peninsula, as has been before mentioned, and the ruins of these great establishments still remain to testify as to their magnitude and importance. On June 25th, 1767, the Emperor Charles III. abolished the Society of Jesus (Jesuits) in Lower California, and gave their property to the Franciscan order. Sixteen of the monks of this latter fraternity landed at Loreto, in Lower California, in 1768, under the Visitador, Don Josef de Galvez; and soon after they established presidios and missions of San Carlos de Monterey, and the same at San Diego, in such a way as to protect all the country, adding, as an intermediate point, the mission of San Buenaventura. In the founding these missions, for which Don Vincente Vila set sail in January, 1769, the vessels met with the greatest difficulties from adverse winds; but they were overcome. All this, however, did not make known to the explorers the existence of the finest harbour of all, that of San Francisco, which was subsequently discovered by a *land expedition*, in 1770.

When the revolution in 1823 occurred, which separated California from Old Spain, a fresh order of things was established, and the country was deprived of their religious establishments; the consequent ruin of these once flourishing communities naturally followed, and nothing can be more deplorable than the subsequent accounts of their downward progress.

The result of the warfare between the United States and the republic of Mexico was the cession by the latter of the territories of California and New Mexico to the United States Government. The exchange of ratification of this treaty took place on May 30th, 1848.

Among the settlers who had introduced themselves into Upper California, after the revolution, was Captain Suter, by birth a Swiss, and who had been a lieutenant in the Swiss guards during the time of Charles X. of France. He had obtained a large grant on the Sacramento River. He fixed his abode and fortification at the head of the tide on the Sacramento, calling it New Helvetia. He constructed a water-mill here, and after one of the freshets to which the stream is liable, on examining the earth brought down by the waters, some particles of gold were picked up, the discovery being almost purely accidental. Further search was made, and an immense quan-

tity of the precious metal, no doubt, was collected.* Ere long this fact acquired publicity, and immediately almost the entire male population of California flocked to the gold region, being the pioneers for the vast influx from every part of the Pacific and neighbouring countries, increasing the population one hundredfold in the course of a very few months. We cannot trace out here the progress of the gold movement, which received its first impetus in 1848. This very singular chapter in the world's history has many illustrations in other places.

The population of California, a very mixed one, is now probably not less than half a million. In 1860 it was 379,994, being an increase of 310½ per cent from 1850. Its area, according to the Report of the U.S. Government Land Office in 1866, was 188,981 square English miles.

Immediately after its accession to the United States measures were taken by the Government to commence a complete survey of the coast. Accordingly, in the autumn of 1848 a surveying party was organised for field work, and the schooner *Ewing*, under Lieutenant W. A. Bartlett, U.S.N., was despatched in 1849, and subsequently a general reconnaissance of the whole coast was completed. Commander Jas. Alden published, in 1853, the results of this preliminary examination, and in 1858 Assistant Geo. Davidson drew up a Directory for this Pacific Coast of the United States, and this useful work was revised and republished by the same zealous officer in 1863. This latter work has been followed hereafter, as it gives a complete hydrographical picture of the coast.

The Winds.—The following remarks are extracted from Mr. Davidson's work:—It has been advised to work close along shore to the northern ports during the summer north-west winds, and take the chances of land breezes to make latitude, but the attempt will double the length of any voyage. Baffling light airs and calms frequently exist along the coast, while vessels several hundred miles off have strong N.W. winds. Moreover, along the coast we know that the current frequently sets 2 miles per hour from the northward, except very close under the shores. In our experience we never yet have met a wind off the land North of San Francisco, and very rarely, indeed, South of it, except in the region of the Santa Barbara channel. As a general rule, it may be safely stated that the summer winds follow the line of the coast, nearly, and gradually draw towards and over the land. In winter, with winds from the southward, this is not so marked.

From April to October inclusive, the prevailing wind is from the N.W., changing to West in valleys opening upon the coast, but in no case so

* It is singular that the existence of gold was ascertained by Sir Francis Drake, for Hakluyt, who was with him, said, in 1589, "There is no part of the earth here to be taken up wherein there is not a reasonable quantity of gold and silver." Yet this traveller's tale remained unheeded for nearly two and half centuries, till June, 1848.

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strongly as through the Golden Gate. During the summer the wind sets in strong about 10 a.m., increasing until nearly sunset, when it begins to die away. During its height it almost regularly brings in a dense fog, which, working its way over the peninsula, meets that already advanced through the Golden Gate, and envelopes San Francisco and the bay by sunset. As a rule, the breeze does not dispel the fog. If a fog exists outside, the wind is sure to bring it in, but the heated earth dissipates it for a time.

From November to March the wind is frequently from the S.E., blowing heavily, working round to the S.W., with a large and broken swell from the S.W., weather thick, rainy, and squally; the wind not unfrequently ending at N.W., with an ugly cross sea. During heavy south-easters the sea breaks upon the San Francisco bar, clean across the entrance, presenting a fearful sight. The sound can be heard at the anchorage in front of the city.

During some winters a hard "norther" will spring up and blow steadily and strongly from one to five days, with a clear blue sky, and cold bracing weather. Winds rarely blow from points between North, round by the East, to S.E.

The further North we advance, the heavier blow the gales in the winter. The N.W. winds are not predicted by the barometer, but, from the S.E., almost invariably; the mercury falling one inch from its usual height of about 30 inches. When it begins to rise, the wind may be looked upon as soon to shift round by the West, and to decrease. Only in one instance during our experience has this failed, and that was off the Strait of Juan de Fuca.

On the tops of the mountains bordering the coast, light variable and easterly airs are frequently experienced whilst the N.W. winds are blowing freshly along the seaboard. Upon Sulphur Peak, in lat. 38° 46', and 26 miles from the coast, we have had fresh breezes from the E.N.E., whilst the usual N.W. winds were prevailing off shore. On Ross Mountain, only 3 miles from the sea, and rising 2,197 feet from the right bank of the Slavi-anska river, we found variable airs when strong summer winds were blowing below.

The COAST.—The monument marking the western initial point of the boundary between Mexico and the United States, is on the table bluff rising from the low land South of San Diego Bay. It is an obelisk of white marble, about 20 feet in height, and resting on a pedestal. It stands near the edge of the bluff, about 200 yards from the sea shore, and is plainly visible from the water. Its geographical position, as determined by the coast survey, is lat. 32° 31' 58.46" N., long. 117° 6' 11.12" W., or in time, 7^h 48^m 24.74^s.

From the boundary the coast is low and flat, running N. by W. for about 7 miles, thence curving gradually westward, until it is nearly East and

West at the entrance of San Diego Bay. The interior of the country is marked by high mountains.

POINT LOMA.—This is the southern part of the western boundary of San Diego Bay, and the termination of a remarkable narrow spur of coarse, crumbling sandstone, which rises South of Puerto Falso, or False Bay, and West of the town of San Diego, to the height of 300 feet; and after stretching South for about $5\frac{1}{2}$ miles, gradually increasing in height to 422 feet, terminates very abruptly. A *lighthouse*, presently described, stands on this highest part. The peninsula is covered with coarse grass, cacti, wild sage, and low bushes.

SAN DIEGO BAY.—Next to that of San Francisco, no harbour on the Pacific coast of the United States approximates in excellence that of the Bay of San Diego. It is readily distinguished and easily approached, and a depth of 22 feet can be carried over the bar, which is three-quarters of a mile East of the southern extremity of Point Loma, and between it and the tail of the Zuniga shoal. The bar is about 650 yards across from the outer to the inner 5-fathoms lines.

Vessels coming from the N.W. make the ridge of Point Loma as a long flat-topped island when about 25 miles distant. This appearance is occasioned by the bay to the S.W., by the low land to the N.E., and by the Puerto Falso at the North. By night the cape is shown by the lighthouse presently described.

A thick field of kelp lies along the western shore of Point Loma, the inner edge being about 1 mile off shore, and having a breadth of half a mile. The outer edge marks the line where the depth of water suddenly changes from 20 to 10 fathoms. The field commences off the bar at the entrance to False Bay, and stretches southward $2\frac{3}{4}$ miles South of Point Loma. Approaching the South end of Loma, along the outer edge of the kelp, pass through a partial break in it, and when the point bears N.E. by E., distant $1\frac{1}{2}$ mile, keep along the northern edge of the kelp in $4\frac{1}{2}$ fathoms, and about half a mile from the point. As soon as the point is passed, a long, low beach of shingle is opened, making out from the East side of the point, and forming a natural break-water, formerly called *Punta de Guiranas*, or *Punta de los Guijarros*, by the Spaniards, but now designated as *Ballast Point*.

Round up gradually until Ballast Point is brought in range with the easternmost house of La Playa (distant 1 mile from Ballast Point, and on the same side of the bay), and be careful not to open more of the village, as the shoal called *Barros de Zuniga* stretches South from the East side of the entrance, parallel to the ridge of Point Loma, and distant only three-quarters of a mile from it. Between Point Loma and this shoal runs the channel, which is less than half a mile wide within the 3-fathoms lines. With the least swell the breakers show the position and extent of the shoal; and at low tides part of it is bare. It has been said that a rock, having

but 5 or 6 feet of water upon it, lies in the channel, its position being marked by a patch of kelp, which is, however, torn away in heavy weather; but the examinations of the coast survey have developed no such danger.

During the summer keep as close to Point Loma as the draught of the vessel will permit, and lay on the wind up to Ballast Point, off which 4 fathoms can be carried within a ship's length, with 10 fathoms in mid-channel, and a very strong current on the ebb and flood tides; the former setting over the Zuniga shoal. After passing Ballast Point, steer for La Playa, and anchor anywhere in from 4 to 10 fathoms, with good holding-ground. Inside the point, and about 250 yards N. by W. from it, is a shoal having only 12 feet water upon it, in a line from Ballast Point to the westernmost house at La Playa. It is a quarter of a mile long. The shoals on the starboard hand, after entering, are plainly in sight, except at very high water. The channel, however, is buoyed, and cannot be missed. From La Playa to New San Diego, 4 miles distant, the channel curves to the right and contracts, but about 6 fathoms water may be carried that far. A mile or two beyond the town the bay becomes shoal, and filled with flats, yet a very narrow 3-fathoms channel runs close along the eastern shore, nearly to the head of the bay.

Coming from the South, run for the extreme end of Point Loma, until Ballast Point and La Playa are in range, as before, and follow the foregoing directions.

When inside the harbour the vessels are perfectly safe, but during very heavy southerly weather, the kelp is said to drive in such masses as to make vessels drag their anchors. We have never known such a case, and doubt if a vessel, with good ground tackle and proper attention, would suffer from this cause; and the holding-ground is excellent. In heavy S.E. weather the sea breaks over Ballast Point.

Point Loma Lighthouse.—This primary sea-coast light is less than half a mile from the southern end, and situated upon the highest part of the point, 422 feet above high water. The building consists of a stone dwelling, with a low tower of plastered brick rising from the centre. The light is 450 feet above the sea, and is a *fixed white light*, which illuminates the entire horizon, and in clear weather should be visible 28 to 30 miles off.

It is high water (corrected establishment at La Playa) at 9^h 38^m; springs rise 5.0 feet, and neaps 2 feet 4 inches.

The eastern side of the entrance to San Diego Bay is low and flat, covered with thick bushes and grass. It is called *The Island*, although a peninsula, being very low and narrow towards the head of the bay. On Ballast Point, at the base of the Point Loma ridge, are visible the ruins of the old Spanish fortifications, &c.

From Ballast Point the bay runs about North for a mile and a half, thence curves gradually to the eastward for 3 miles, to *New San Diego*;

thence to the head of the bay south-east 7 miles. The average width of the bay, after passing La Playa, is a mile and a half, but at New San Diego it again expands to about a mile and a half, with low shores and extensive marshes and flats.

The great drawback in San Diego Bay is the want of fresh water, which has to be brought from the river. Fresh provisions are readily procured here. Wood is scarce and not good.

A vein of coal (lignite) has been discovered near San Diego, and was reported of excellent quality; but no genuine coal is to be found upon the coast, and in 1851 a report was made against this very deposit. When fishery assumes a practical shape upon this coast, the harbour of San Diego will become a position of importance. Already several small companies are engaged in the whaling business. The waters in this vicinity abound with the "California greys," which are very troublesome to deal with, unless the bomb-lance is used in killing them.*

False Bay.—At the North end of the ridge of Point Loma is an extensive shoal bay called Puerto Falso, or False Bay. The bar at its entrance lies N. by W. $\frac{1}{2}$ W., distant $5\frac{1}{2}$ miles from the southern extremity of Point Loma; and having but 3 ft. of water, it can be crossed only in the smoothest weather. The northern point of this bay is about 2 miles in length, very narrow, and covered with low sand dunes.

To the North and West of this the shore becomes compact and unbroken, except by the valleys of San Luis Rey and San Juan Capistrano. The waters off this stretch of the coast Vizcaino is called the bay of Santa Catalina.

From the southern extremity of Point Loma the coast runs N. by W. for 22 miles, thence to Point Lausen (of Vancouver, 1793), forming the East point of San Pedro Bay, N.W. by W. $\frac{1}{2}$ W. nearly 60 miles.

San Luis Rey.—The mission of San Luis Rey is the largest in California, and the number of domesticated Indians formerly in its neighbourhood gave it the appearance of a large and thriving settlement. It was founded June 13th, 1798, stands in a rich valley from 1 to 2 miles wide, and is about 3 miles from the ocean, being separated therefrom by a range of hills. It is nearly in the centre of a section of country unequalled for salubrity and productiveness, but the scarcity of rain is an insuperable drawback. The mission is now a military post, but very few men are stationed there.

The anchorage is very much restricted and unprotected, and now never visited. Latitude $33^{\circ} 17' N.$, long. $117^{\circ} 29' W.$

San Juan Capistrano.—Now a place of no importance, with an unpro-

* San Diego Bay was discovered by Juan Rodriguez Cabrillo, a Portuguese in the service of Spain, in September, 1542, called Port San Miguel. It received its present name from Sebastian Vizcaino, who surveyed it in November, 1602.

ected anchorage, rocky bottom, and bad landing. This mission, like all the others, is rapidly going to decay. The anchorage is in lat. $33^{\circ} 27' N.$, long. $117^{\circ} 43' W.$

This mission is very pleasantly situated in a grove of trees, whose luxuriant and diversified foliage, when contrasted with the adjacent shores, give it a most romantic appearance.

The bay, or rather the outer half-tide rock, on which Sir E. Belcher observed, is in lat. $33^{\circ} 26' 55'' N.$, long. $117^{\circ} 42' W.$ It has a high cliffy head to the N.W., but terminates in low sandy beaches to the southward. The anchorage is foul under 5 fathoms, is unprotected, and the landing bad.*

SAN PEDRO BAY.—This bay is well protected in every direction, except against the winter gales from the S.E. round to the S.W. During the spring, summer, and autumn, it is an excellent roadstead. From *Point Fermin*, which is the S.E. portion of high land West of the bay, the line of bluff runs exactly North and South for about 2 miles, being bold, and averaging 60 feet in height.

Vessels coming from the westward through the Santa Barbara channel, make San Pedro hill (1,600 feet in height), forming the West side of the bay, as an island projected against the mountains to the southward and eastward. Approaching *Point Vicente*, which is the S.W. point of the hill, vessels can keep it close aboard, there being from 50 to 80 fathoms within a mile of the shore; round *Point Fermin* within half a mile, in from 6 to 10 fathoms, and open the small island called *El Moro*, run for that island, and when abreast of the landing (readily recognised by the houses on the bluff), about 1 mile North of *Point Fermin*, anchor in 3 fathoms, hard bottom, and half a mile off shore. Vessels must anchor a mile off to get in 5 fathoms.

Coming from the South with N.W. winds, beat in boldly until abreast of the landing; keep the lead going, and anchor anywhere in its vicinity. Do not approach the low shore, to the North and East of *El Moro*, closer than 1 mile, at which limit four fathoms water will be found.

In winter anchor further out, and more to the southward, in order to be able to slip the cable and go to sea, should a heavy south-easter spring up.

The waters of the lagoon, inside of the low sandy beach, and a mile or

* The mission is situated in a fruitful-looking sheltered valley, said to abound in garden luxuries, country wines, and very pretty damsels, whence the favourite appellation *Juanitas*. I suppose, therefore, that they all assume this name. As many call here apparently, to my view, at risk of anchor and cable, I was induced to ask the master of a vessel who called upon me what brought him here? "It is only visited for stock, fruit, or vegetables," was his dry reply.—(Sir Edward Belcher.)

more northward of El Moro, find their principal outlet between that island and the bluff point half a mile West of it. The entrance is very narrow and crooked, and has two buoys, about 200 yards apart, to mark it. It is stated that the bar at the entrance to the creek remains about the same (as it did in 1852). At mean low water, only 2 feet of water can be carried over it. A small tow-boat is now used for taking vessels to New San Pedro, situated about 3 miles inside the bar.

Wood and water are not readily obtained, and charges are high. The beef raised here is remarkably tough.*

The astronomical station of the U.S. survey at the bluff on the landing is, lat. $33^{\circ} 43' 19.6''$ N., long. $118^{\circ} 16' 3.0''$ W., or in time, $7^h 53^m 4.2^s$.

The town of *Los Angeles* or *Pueblo de los Angeles* (the country town of the Angels) is 22 miles North by the road from San Pedro, and is the centre of an extensive grazing, agricultural, and grape-growing country. The quantity of grapes and fruit generally shipped to San Francisco during the proper season is already enormous, and it promises to be an important wine-growing country. Regular communication is maintained with San Francisco and other ports by steamers and sailing vessels. In summer the Santa Anna is said to frequently dry up before reaching the lagoon.

From Port Vicente the coast trends N. by W. $\frac{3}{4}$ W. for 17 miles; thence W. by S. to Point Dume in lat. $34^{\circ} 0'$ N., and long. $118^{\circ} 41'$ W.; thence to Point Mugu W. $\frac{1}{2}$ N. for 17 miles. The last point lies N.E. by E. $\frac{1}{4}$ E., distant 14 miles from the eastern end of Anacapa. This long curve in the coast is known as the *Bahia Ona*.

Point Dume rises into a dome-like form 2 or 3 feet high. The land immediately behind it falls away, so that in making it from the West, it rises into view as an island close under the high mountains. Eastward of Dume the mountains spring directly from the water.†

* Sir George Simpson, who visited it in his overland journey round the world in 1841-2, says,—“San Pedro is an open bay, which has no better claim to the character of a harbour than almost any other point on the coast, being exposed to both the prevailing winds, and being destitute of everything in the shape of a house, or even of a shed. Its only recommendation is, that it affords access to the Pueblo of Nuestra Senora, about 18 miles distant, which contains a population of 1,500 souls, and is the noted abode of the lowest drunkards and gamblers of the country. This den of thieves is situated, as one may expect from its being almost twice as populous as the two other pueblos taken together, in one of the loveliest and most fertile districts of California; and being, therefore, one of the best marts in the province for hides and tallow, it induces vessels to brave all the inconveniences and dangers of the open and exposed Bay of San Pedro.—(Sir Edward Belcher

† At the bottom of the bay, between Point Dume and Point Vicente is a bitumen spring. In reference to this, when Vancouver anchored in a small bay 60 miles to the north-westward, he says:—“The surface of the sea, which was perfectly smooth and tranquil, was covered with a thick slimy substance, which, when separated or distributed by any little agitation, became very luminous, whilst the light breeze that came principally

From Point Mugu to San Buenaventura, distant 17 miles, the coast has a general trend N.W. by W.; but about midway it curves south-westward of this course $2\frac{1}{2}$ miles towards Anacapa, thus contracting the eastern entrance to the Santa Barbara channel. Two miles West of Point Mugu is *Laguna Point*, close under which is very deep water, the 10-fathom line running within 250 yards of the shore. Between Mugu and Buenaventura the coast is low, flat, and sandy, being the opening of the valley of Santa Clara, through which flows the Santa Clara river. This stream is nearly dry during the summer, and terminates in lagoons and marshes.

The eastern entrance to the Santa Barbara channel lies between the eastern end of Anacapa Island and Point Hueneme, which is about halfway between Mugu and Buenaventura. From Anacapa, Point Hueneme bears N.E. by N. $\frac{1}{2}$ N., distant $9\frac{1}{2}$ miles. Directly off this point is found a remarkable example of a submarine valley, commencing with a depth of 10 fathoms, 400 yards from the beach, increasing to 50 fathoms in five-eighths of a mile, and to 113 in less than 2 miles. Its general direction is South, with a width of a mile, and bounded on either side by depths of 12 and 15 fathoms. The best landing is directly on the point. Landing in the bight to the eastward and leeward is impracticable. Vancouver says this was called *Point Conversion* on old Spanish maps; he placed it in lat. $34^{\circ} 9'$, and retained the name.

There is excellent holding ground off Buenaventura in 10 fathoms, but the landing is not good; the 3-fathom line lies about a quarter of a mile off shore.

Buenaventura.—The *mission* of Buenaventura, situated at the foot of the dividing ridge of the valleys of San Buenaventura and Santa Clara, about half a mile from the shore, was founded March 31, 1782. Lat. $34^{\circ} 15' N.$, long. $119^{\circ} 15' W.$ Fifteen miles westward of Buenaventura, on the coast there is a rich deposit of sulphur, surface specimens of which have yielded sixty per cent. Around the locality are found ashes and scoria. The ground is hot, and the gas emitted is almost suffocating.

SANTA BARBARA.—From San Buenaventura to Santa Barbara the

from the shore brought with it a very strong smell of burning tar, or of some such resinous substance. The next morning the sea had the appearance of dissolved tar floating upon its surface, which covered the ocean in all directions within the limits of our view, and indicated that in this neighbourhood it was not subject to much agitation." This singular fact, which might be turned to profitable account, has also been noticed by others:—"Off this part of the coast (near Santa Barbara) to the westward, Capt. Sir Edward Belcher says, we experienced a very extraordinary sensation, as if the ship was on fire, and after very close investigation attributed it to a scent from the shore, it being much more sensible on deck than below, and the land breeze confirming this, it occurred to me that it might arise from naphtha on the surface.—Voyage of the *Sulphur*, vol. i. p. 320. This was before petroleum was thought of. It is mentioned again presently.

North Pacific.

distance is 23 miles, and the bearing nearly W. by N. Santa Barbara is an open roadstead for all except northerly winds, which are unfrequent. On the West of the long low sandy beach is a bold bluff called *Point Filipe*. The hill rising behind it is called *La Vigia*.

The landing is on the beach about half a mile East of Point Filipe; the shore is very low and flat as far as the town, three-quarters of a mile distant, but gradually rises to the mission, which is a prominent object about 2 miles inland.

Vessels coming from the westward first sight La Vigia, and, upon approaching the anchorage, keep outside the line of kelp (here nearly half a mile wide), gradually round the point upon which is situated the lighthouse, 2 miles south-westerly of the landing, keep along the kelp until abreast of the town, and anchor in 7 fathoms; or pass through the kelp, and anchor in the inside in $3\frac{1}{2}$ fathoms hard bottom. In anchoring far enough off to get 9 or 10 fathoms, the bottom will be found sticky.

No dangers have been discovered in the kelp off this beach. With the least swell, the surf on the beach is a bad one, not falling square on, but cutting it at a sharp angle. In winter, vessels must anchor outside of the kelp, as the gales detach and drive it shoreward in such vast quantities, that, coming across a vessel's hawse, it helps to bring home her anchors.

The Lighthouse at Santa Barbara consists of a plastered dwelling, with a low grey tower rising through the roof. It shows a *fixed white light*. It is situated at an elevation of 180 ft. above the sea, 2 miles south-westwardly from the landing on the beach, lat. $34^{\circ} 23' 35''$ N., long. $119^{\circ} 42' 5''$ W. The light, as seen from the sea, will be projected against the hill rising behind it. It can be seen at a distance of 19 to 20 miles.

Santa Barbara is a town of considerable size, lying in the middle of an agricultural tract, running East and West, at the southern base of the Sierra Concepcion, but of limited breadth. The trade with San Francisco is not extensive; but this being one of the greatest stock-raising districts on the coast, vast droves of cattle pass through and are sent to San Francisco, and the mining districts.*

The mission, founded December 4th, 1786, is one of the largest and best establishments of the kind in California, and in the gardens attached to it the grape and olive were cultivated with success.

Sulphur, in large beds and of superior quality, exists along the seaboard, and manifests itself in all the warm springs. Wood and provisions in abun-

* A large bitumen pit, about 8 miles West of Santa Barbara, empties directly into the ocean, and the bitumen floating on the water works against the summer or north-west winds, even beyond Point Concepcion. Very frequently, in calm weather, a great extent of the surface of the channel becomes iridescent from the thin film of bitumen spread over it. The rocks along the shore, even to the westward of Point Concepcion, are covered with it.

dance can be easily obtained here. Water is plentiful, but not so readily procured.

A very short distance back from the coast-line is a range of rugged hills, over 2,000 feet high, forming part of the *Sierra Concepcion* (sometimes called the *Sierra San Inez*), whose sides are sparsely covered with timber. The coast trail to San Francisco passes along the shore for a distance of 15 or 20 miles to the Gaviota Pass; thence inland to the Santa Inez valley, which runs nearly parallel with the coast.

The coast-line from Santa Barbara light to Point Concepcion light runs W. by S., distance 37 miles. The rugged hills westward of the Gaviota Pass come close to the shore, forcing the traveller to leave the beach for their sea slope, the trail passing over steep ridges and down valleys.

POINT CONCEPCION.—This characteristic and remarkable headland, about 220 feet in height, lies at the western entrance to the Santa Barbara channel. Once seen, it will never be forgotten. When made from the northward, or from the eastward, it rises as an island, but upon approach is found to be a high promontory, stretching boldly into the ocean, and terminating abruptly. The land behind it sinks comparatively low, and at first gradually, but soon rapidly rises to the mountains, which attain an elevation of 2,500 feet. Between three and four hundred yards South of the face of the cape is a large rock nearly awash, upon which some of the California steamers have struck in very foggy weather.

The **LIGHTHOUSE** on Point Concepcion stands on the extremity of the cape, and upon the highest part, which is 220 feet above the sea. Seen from the southward, it will be projected against the *Sierra de la Concepcion*, and appear about one-third of their height from the water. It is a primary sea-coast light, consisting of an illuminating apparatus of the first-order lens, and exhibits a *revolving* white light, showing a flash every *half minute*, throughout the entire sea horizon. It is elevated about 250 feet above the sea, and should be visible at from 22 to 27 miles off. Its latitude is $34^{\circ} 26' 47''$ N., long. $120^{\circ} 27' 0''$ W., or in time $8^h 1^m 48.0^s$.

A *fog bell*, weighing 3,136 pounds, is placed on the edge of the bluff, seaward of the lighthouse, which is sounded during foggy or other thick weather, night and day, every $13\frac{1}{2}$ seconds.

Next to the islands of the Santa Barbara Channel, Point Concepcion is the most prominent and interesting feature between San Francisco and the peninsula of Lower California. It has very justly and appropriately been termed the "Cape Horn" and the "Hatteras" of the Pacific, on account of the heavy north-westers that are here met with on coming through the channel, with a great change of climate and meteorological conditions; the transition being remarkably sudden and well defined.

During some summer seasons the fog is almost interminable, but more particularly among the islands. For the space of six weeks, with clear days

and nights at the cape, the islands have been invisible; rising, however, to an elevation of 1,000 or 1,500 feet, the observer plainly sees the summits of the islands over the sea of fog which envelopes them.

When the fogs prevail, they generally roll in from seaward at sunset, and clear away about ten o'clock next morning.*

EL COXO.—Two miles East of Point Concepcion is the anchorage of El Coxo, off the entrance to the valley of that name. This anchorage is a better one than that of Santa Barbara, and the kelp is not so compact. After passing the point from the westward, at a distance of about three-quarters of a mile, when the valley will open with a sand-beach off it, anchor outside or inside the kelp, according to the choice of depth, 5 fathoms being obtained within a quarter of a mile of the shore, with hard, sandy bottom. Ten fathoms water will be found half a mile from the shore.

There is a large rancho at El Coxo, and it is one of the very best tracts for grazing. The beef has a finer flavour and more delicacy than any we have met with on the coast. The water is disagreeable to the taste. The primary astronomical station of the coast survey was on the top of the bluff, and between 250 and 300 yards W. $\frac{1}{2}$ S. from the mouth of the creek. Its geographical position is lat. $34^{\circ} 26' 56.5''$ N., long. $120^{\circ} 25' 39''$ W., or in time, $8^h 1^m 42.6^s$.

ISLANDS OF THE SANTA BARBARA CHANNEL.

The name of El Canal de Santa Barbara was given by Vizcaino, in December, 1602, to the narrowest part of the channel lying East and West, and about 24 leagues in length. Until the U.S. coast survey first examined in detail the islands lying off the main between San Diego and Point Concepcion, nothing accurate was known of their number, peculiarities, extent, or position.

It may not be here amiss to call attention to the abundance of mackerel found in the channel. We have seen the water fairly alive with them, and have caught them by hundreds. Crayfish of a very large size are found in great numbers along the shores. The rainy season commences in the early part of November, and continues until the middle of March. The quantity of rain that falls does not average over 15 inches, but some seasons are marked by excessive drought. During the winter S.E. gales prevail, and sometimes during the summer months southerly weather will bring up heavy rain.

CORTES SHOAL.

Commencing at the southward, the first object that claims our attention is the dangerous bank and rock called the Cortes Shoal, bearing S.W. $\frac{1}{4}$ W.

* Point Concepcion was discovered by Cabrillo in 1542, and called Cape Galera. It was afterwards named Punta de la Limpia Concepcion.

from the S.E. end of the island of San Clemente, and distant 46 miles. The extent of this bank has been sounded out carefully, and found much greater than the early examinations led us to suppose. Within the limits of the 50-fathom curve the general trend is parallel with the islands of Santa Catalina, San Clemente, and San Nicolas, and it stretches about 17 miles from lat. $32^{\circ} 24' N.$, long. $118^{\circ} 59\frac{1}{2}' W.$, to lat. $32^{\circ} 32' N.$, long. $119^{\circ} 17\frac{1}{2}' W.$, but curves slightly to the S.W. It has an average and nearly uniform width of $3\frac{1}{2}$ miles. The nature of the bottom is hard, composed of white sand, broken shells, and fine coral at the S.E. portion, and sand with broken shells at the N.W. The shoalest and most dangerous part is that known as the *Bishop Rock*, lying 5 miles from the S.E. tail of the bank, and having but $2\frac{1}{2}$ fathoms of water upon it. Around this danger the depth increases gradually, and in an extent of $2\frac{1}{2}$ miles in the general direction of the bank reaches but 15 fathoms. The geographical position of these rocks is lat. $32^{\circ} 25\frac{3}{4}' N.$, long. $119^{\circ} 5' W.$ From the N.W. end of the island of San Nicolas the rocks bear S.E. $\frac{1}{2}$ S., distant 57 miles; and from the S.E. end of San Clemente they bear S.W. $\frac{1}{4}$ S., distant 46 miles. The next shoal spot is one of 10 fathoms, about the middle of the bank, and of limited extent, being only half a mile square within the 15 fathom curve. From the N.W. end of San Nicolas the spot last mentioned bears S.E. by S. distant 54 miles; and from the S.E. end of San Clemente it bears S.W. $\frac{1}{4}$ W., distant 50 miles. From the Bishop Rock it bears W. $\frac{1}{4}$ N., distant 5 miles.

To the north-westward of this latter shoal spot the depth is nearly uniform at 49 fathoms for $7\frac{1}{2}$ miles, and between it and the Bishop Rock the depth is uniform at about 43 fathoms.

Upon this bank the current is variable, frequently setting against the strong N.W. winds with a velocity of nearly 2 miles per hour, and producing at all times a heavy swell, and even in moderate weather breaking heavily upon the rocks. In passing over the bank at night we have been sensible of our proximity to it by the increased swell. In the detailed examination of 1856 it was found that the general set of the current was to the southward and eastward, and the greatest velocity a mile and a half per hour; but no statement is made concerning the prevailing wind.

It lies in the direct route now followed by the Panama and San Francisco steam-ships, and was discovered by Capt. Cropper, of the steam-ship *Cortes*, in March, 1853. His position was determined by bearings upon San Nicolas and San Clemente, and was very close, being within a mile of the latest and best assigned place. He says that the water around it was in violent commotion, and thrown up suddenly in columns at regular intervals of four or five minutes. At first he thought he saw breakers, and occasionally the water broke as on a reef, but he became confident that the disturbance was owing to submarine volcanic agency. The specimens of the bottom negative this idea. He found his depth of water reduced from 42

fathoms to 9, which convinces us that he was on the shoal spot, about the middle of the bank, and saw the water breaking upon the Bishop Rock, the same appearance that he witnessed, having been seen many times since by others, and the nature of the rocky bottom and depth of water supporting the assumption.

ISLAND OF SAN CLEMENTE.

This, like all the islands of the Santa Barbara Channel is high and bold, the southern end being the higher, and gradually falling to the northward. The general trend of the island is N.W. by W., its length 22 miles, with an average breadth of 2 miles, and 50 miles in circuit. The S.W. point of the island bears W. $\frac{1}{2}$ S. from Point Loma, distant 60 miles. At the N.W. end is a small indentation of the shore-line, forming an anchorage, having a width of three-quarters of a mile, by half a mile in depth, with soundings decreasing from 12 fathoms, on the line of a large rocky islet at the side to a point E. by S., to 4 and 5 fathoms close in shore. Kelp will be found in 10 fathoms, but the bottom is tolerably regular and hard. It is anything but a pleasant or safe anchorage in bad N.W. weather, and even in heavy southerly weather the swell must roll in disagreeably.

Under the S.E. end of the island anchorage may be had in the deepest part of the indentation, but the bottom is rocky and irregular. The S.E. point is a vast sandstone pyramid; and when it is brought to bear North, and the shore three-quarters of a mile distant, the anchorage will be W. by N. $\frac{1}{2}$ N., $1\frac{1}{2}$ mile inside the kelp, in 10 to 15 fathoms, and one-third of a mile from the narrow sand-beach at the foot of the cliffs. Outside of the kelp the depth ranges from 10 to 30 fathoms.

This anchorage will afford protection in heavy N.W. weather. The soundings around the island show a depth of from 36 to 130 fathoms close in shore, except off the N.W. point, from which a reef makes out about a mile. Neither wood nor water can be had here. The whole island appears unfit for raising stock, on account of the want of water. Very few trees are found, and the aspect is sterile. This island was discovered by Cabrillo in 1542, and called by him San Salvador, after one of his two vessels. The present name was given by Vizcaino in 1602.

ISLAND OF SANTA CATALINA.

This island rises to a height of about 3,000 feet, and is remarkable for the great transverse break or depression, 5 miles from the northern end, running partly through it, and forming an anchorage or cove on each side. The land connecting these is very low, say not over 30 feet; but the hills rise up on each side two or three thousand feet, and when sighted from the North or South the whole appears like two very high islands. The general trend of the island is W. by N. $\frac{3}{4}$ N.; its length $17\frac{1}{2}$ miles, with an average

breadth of 4 miles to the southern part, and 2 miles to the northern, while the shore-line amounts to about 42 miles.

The depression in the island bears S.S.W. from Point Fermin, and is distant $18\frac{1}{2}$ miles.

The harbour or cove in the southern side, 5 miles from the northern end, is only about one-third of a mile in width, but its approaches are bold, and so far as known, free from hidden dangers; to find it, run along the S.W. side of the island, and make the depression; then stand in for the opening, keeping a little left of mid-channel, until a third of a mile inside of the heads. From thence keep in mid-channel, until abreast of the long, low point on the right, and anchor in 5 fathoms, soft bottom. There is a depth of 3 fathoms inside of the low point, with hard bottom, but not room enough for a vessel to swing. If the wind is blowing from the N.W., vessels will lose it at the heads, and perhaps require to be towed in.

The anchorage on the North side of the depression is also small, with a reef in the centre, and two large outlying rocks. A steamer could run in on the West side of the rocks, and anchor off the low beach in 10 fathoms, when the reef would lie N. by E. from her, distant an eighth of a mile. Small craft will here find protection from the prevailing winds, but experience difficulty in getting out, as there is always a swell setting in, and the wind blows in flaws and eddies on account of the high hills. Between the two points forming the anchorage the distance is half a mile, and the depth one-third.

The soundings around the island show bold water from 19 to 75 fathoms, close in shore, with no outlying rocks except off the North cove. The shores are rocky, and on the southern side fearfully abrupt, but on the northern shore there are several indentations, where boats may land at almost any season. Deep and precipitous gulches are formed by the ridges of rock running diagonally across the island from N.E. to S.W., and occasionally a small valley varies the scene. Four or five settlers cultivate these spots, but their inconsiderable extent precludes the realizing of anything beyond a sustenance. About midway between the N.W. extremity of the island and the great break there is a spring of good water, and at the S.E. point good water has been obtained by sinking wells to a depth of 50 feet or more, but in the intermediate places water found at the same depth is brackish.

This island was discovered by Cabrillo in 1542, and called by him La Victoria, after one of his two vessels. It received its present name from Vizcaino in December, 1602, when it was thickly inhabited by a people reported to be very ingenious, particularly in pilfering and concealing, some examples of which accomplishment they gave the Spaniards. Padre de la Ascension, who accompanied this expedition, gives very particular descriptions of a kind of temple to the sun, with images and idols found near the two coves.

ISLAND OF SANTA BARBARA.

This is one of the only two small islands of the Santa Barbara group. It lies on the line between the North end of San Clemente and the East end of Santa Cruz, and almost exactly half way between them. From the North end of Santa Catalina it bears W. by S. distant 23 miles. The extent of the island would not exceed 2 miles of shore line; its elevation at the highest part is about 500 feet, and the top has an area of about 30 acres, covered with soil, but no water is found, and not a vestige of wood. The shores are rocky and abrupt, presenting on the N.E. and South sides perpendicular cliffs, exposed to the full force of the ocean swell. Landing is at all times difficult and dangerous, the water around it is deep, and there are no out-lying rocks. It is said to be much more enveloped in fogs than the neighbouring islands. Its approximate position is lat. $33^{\circ} 30' N.$, long. $119^{\circ} 2' W.$

ISLAND OF SAN NICOLAS.

Of the Channel Islands this is the most distant from the coast, as well as the driest and most sterile. It is about 600 feet high, abrupt, and, like San Clemente, comparatively flat-topped, but falling to the southern end. The sides are bold and precipitous, and composed of coarse sandstone.

Its general direction is W.N.W.; its length is 8 miles, with an average and nearly uniform width of $3\frac{1}{2}$ miles, whilst the extent of shore-line is about 22 miles. The North point of the island bears S.E. by E. from Point Fermin, distant 67 miles; the line passing 1 mile South of the island of Santa Barbara.

At the North end of San Nicolas heavy breakers make out $2\frac{1}{2}$ miles, and the soundings towards the Begg Rock show irregular and rocky bottom. Breakers also extend from the southern point, to the distance of a mile and three-quarters according to Kellet. This is doubtless the case in heavy weather. The soundings around the island show depths varying from 10 to 48 fathoms. Off the S.E. point, which is low and sandy, vessels may anchor in 10 fathoms, hard bottom, with a current running steadily to the southward, which makes the landing bad, as the surf cuts the beach at an acute angle. The sandy point just referred to is in lat. $33^{\circ} 14' 12.9'' N.$, long. $119^{\circ} 13\frac{1}{2}' W.$, or in time $7^h 57^m 40^s$. This island was not seen by Vancouver in 1793.

The John Begg Rock is situated on the prolongation of the longer axis of the island of San Nicolas, bearing N.W. by W. $\frac{1}{4} W.$ from its nearest (N.W.) point, and distant 7 miles. The rock is about 40 feet high, bold, and well defined, and can be easily seen at a distance of 10 miles. The soundings between it and the island indicate the existence of a submarine ledge con-

necting them. Its approximate geographical position is lat. $33^{\circ} 22\frac{1}{2}'$ N., long. $119^{\circ} 13\frac{1}{2}'$ W.

It was named after the ship *John Begg*, which struck upon a reef near it, September 20th, 1824, and was nearly lost. The foul bottom is covered with kelp.

ISLAND OF ANACAPA.

This is in fact a curiously formed group of *three* islands, extending in a nearly E.N.E. direction, their entire length being 5 miles. The West end of Anacapa is a peak 930 feet in height, with a base of over 2 miles by three-quarters of a mile. This is separated from the middle island by a gap 10 feet wide, through which boats can pass. The middle island is nearly 2 miles long by 500 yards wide, whilst the eastern island is little over a mile long, by 500 yards wide. The gap separating the middle and eastern islands is over 200 yards wide, but so completely filled with rocks as to be impassable for boats, which can, however, land on the North side of the island.

The West end of Anacapa is $4\frac{1}{2}$ miles from the eastern point of the island of Santa Cruz, and bears E. $\frac{1}{2}$ N. from it. The depth of water between these islands is 30 fathoms, with a very regular bottom, composed of grey sand, coral, and shells. The eastern end of the island bears S.E. $\frac{3}{4}$ E. from the Santa Barbara light, distant 28 miles, and from Point Hueneme or Conversion, the nearest point of the mainland S.W. by S. $\frac{1}{2}$ S., distant $9\frac{1}{4}$ miles. Anacapa is in lat. $31^{\circ} 1'$ N., and between longitudes $119^{\circ} 19'$ and $119^{\circ} 24'$ West. Upon it the site for a lighthouse has been recommended.

The island is composed of coarse, dark grey sandstone, very rotten and crumbling. The sides are perpendicular, and from 250 to 300 feet high. The main peak is marked on the North side by several deep gulches, with almost vertical sides running from the summit to the bluff. The whole formation is filled with innumerable cavities, giving it the appearance of an enormous blackened honeycomb. At the eastern extremity is found a very beautiful arch in one of the outlying rocks. The soil is loose and thin, producing only a few dwarfed species of cactus, and a thick-leaved succulent plant. Not a drop of water is to be found on the island.

Anacapa is a place of great resort for the seal, sea-lion, and formerly of the otter, but the latter have been nearly all killed off. It was on this island that the steam-ship *Winfield Scott* ran ashore during a dense fog at midnight, December 2nd, 1853, in calm weather.

ISLAND OF SANTA CRUZ.

This island is the largest of the channel group, and lies broad off the coast opposite the town of Santa Barbara, at a distance of 20 miles. Its general

direction is East and West, with a length of 21 miles, and an average width of 4 miles, while the extent of its shore-line is not less than 53 miles. On the northern side of the island and near the middle, the shore makes a moderately deep curve, forming a roadstead called *Prisoner's Harbour*, at the opening of a valley, where plenty of wood and water can be obtained. Anchorage may be had a quarter of a mile off the middle of the beach in 15 fathoms, sandy bottom; but there is no protection from the heavy swell setting in with a north-wester; it must, however, afford excellent refuge in S.E. weather.

The soundings around the island show deep water close to the shore, but there are rocks showing quite plainly 1 mile from the S.W. point.

The island is bold, and about 1,700 feet in height. Its eastern part is extremely irregular, barren, and destitute of water, and the surface of the north-eastern portion is thickly strewn with large angular pieces of stone, as if broken with a hammer. Several species of cactus and some of the coarse grasses flourish. Santa Cruz Island is composed of coarse, dark grey sandstone, crumbling and rotten, like that of Anacapa.

This island was called Juan Rodriguez by Ferrelo, who commanded the ships of Cabrillo after his death, which took place either in *Prisoner's Harbour* or in Cuyler's Harbour (Island of San Miguel).

The group comprising Santa Cruz, Santa Rosa, and San Miguel, was discovered and called San Lucas by Cabrillo in 1542.

ISLAND OF SANTA ROSA.

This is the middle island of the group off the coast between Santa Barbara and Point Concepcion. Its general shape is that of a parallelogram, with the direction of the longer axis almost exactly East and West, and 15 miles in length; and the shorter North and South, giving it a width of 10 miles. The extent of shore-line is about 42 miles.

On the N.W. side of the island, and midway between the North and West points, a reef extends out for a distance of a mile and a quarter. There is a good passage between Santa Cruz and Santa Rosa, with a width of 5 miles, and one between it and San Miguel of 4 miles. Both passages are frequently used by the California and Panama steam-ships.

The soundings around the island do not show as deep water as round the others; on the N.E. and N.W. sides from 15 to 20 fathoms are found, 2 miles from the shore, but in the S.E. and S.W. sides the water is much deeper. The outline of the island is bold, but not so high as Santa Cruz. The hills are rolling, and covered with coarse grass and bushes. No harbours exist round its shores, which are steep and broken. The South point of the island is in lat. $33^{\circ} 53'$ N., long. $120^{\circ} 4'$ W.*

* On some early Spanish charts the two western of the Santa Barbara Islands are called

ISLAND OF SAN MIGUEL.

This is the western of the Santa Barbara Channel Islands its longer axis lying E. $\frac{1}{2}$ N. and $7\frac{1}{2}$ miles in length, with an average breadth of $2\frac{1}{2}$ miles. The extent of shore-line is 21 miles. Its western extremity is bold and narrow, gradually increasing in breadth until it attains $3\frac{1}{2}$ miles. As seen from the south-westward, this end of the island appears to be several hundred feet in height, and composed of sand dunes, therein differing from all the other islands. The eastern face is nearly straight for 2 miles; the southern face is nearly straight along its whole length, with high abrupt shores; and from 30 to 37 fathoms water are found close inshore. On the N.E. side of the island is the small bay called *Cuyler's Harbour*, off which lies a rock or islet, more than a fourth of a mile long, and several hundred feet high. From this islet to the deepest part of the harbour the distance is $1\frac{1}{2}$ mile, and the course S.W. Close under the western side of the harbour is anchorage in 6 fathoms, secure from every wind except the North, which rarely blows here. The eastern part of the bay is full of rocks and reefs, and ought to be avoided. The reef in the middle of the bay bears S.W. from the West end of the islet, and is distant half a mile. It is the same distance from the West point of the bay, near the anchorage, and bears E. by S.

S.W. by S. $\frac{1}{2}$ S. from the West end of the islet is a rock, and rocky bottom, distant a third of a mile, and on the same line another, half a mile distant. The southern part of the islet is about half a mile from the East shore of the bay. The bay shores are high, steep, and rolling, and covered with coarse grass and bushes. There is no water here in summer, but during the winter water drains down the gully at the beach in the middle and southern part of the harbour.

The western point of the island bears S. by E. $\frac{1}{4}$ E., distant 25 miles from Point Concepcion, and S.E. by S. $\frac{1}{2}$ S., distant 35 miles from Point Arguello.

Sheep and some stock have been placed upon San Miguel, but the success of the experiment has been doubtful, certainly unremunerative.

The S.W. part of *Cuyler's Harbour* is in lat. $34^{\circ} 3' N.$, long. $120^{\circ} 20' 27'' W.$ It is high water here, on full and change (corrected establishment), at IX^h 25^m. Spring tides rise 5 feet 1 inch, neaps 2 feet 9 inches.

San Miguel was discovered by Cabrillo in 1542, and *Cuyler's Harbour* is supposed by some to be the bay in which he wintered. He died January 5th, 1543, having directed Bartolome Ferrello, his pilot, to assume the command of the expedition. He called the island Juan Rodriguez. It is some-

San Miguel and Santa Rosa (naming the western first), and upon the others Santa Barbara and Miguel. The present names and order are those adopted by Vancouver in 1793.

times called San Bernardo. Cuyler's Harbour was named by the U.S. Coast Survey in 1852.

Two rocks, showing themselves well above water, lie N.W. by W. from the western extremity of San Miguel, the larger being distant 5 miles. It bears S. $\frac{1}{4}$ E., distant 22 miles, from Point Concepcion, and S.S.E., distant 30 miles from Point Arguello. Off the inner and smaller rock a reef extends a short distance to the southward and westward. Deep water is found around the rocks, and vessels may pass between them. The total extent of shore-line of the Santa Barbara Islands is about 232 miles.

The COAST, from Point Concepcion northward.—The first headland to the northward of Point Concepcion is Point Arguello, distant 12 miles, and bearing N.W. by W. $\frac{1}{4}$ W. The shore is bold and compact, curving slightly to the eastward between the two points, and the mountains immediately behind are not less than 3,000 feet in height.

Point Arguello.—Two or three hundred yards off Point Arguello are some detached rocks, upon which the steam-ship *Yankee Blade* struck and was lost on the 1st of October, 1854, and 415 persons perished.

Eight miles North of Point Arguello a small stream empties into the ocean. It is insignificant and unimportant. On former charts it is called the Rio de San Balardo or the San Geraldo, the Bernardo or Santa Inez. On the U.S. Coast Survey charts it is designated *La Purissima*, from the mission La Purissima Concepcion, situated a few miles inland.

The first point northward of Point Arguello is *Point Purissima*, off which makes a reef about a fourth of a mile to the S.S.W. This is known on the coast as *Point Pedernales*, signifying Point of Flints, but now generally and erroneously printed "Pedro Nales." Formerly it was called *San Pedro Nolasco*. Near this point the steam-ship *Edith* was lost in 1849. Between Points Sal and Purissima a small stream called the *Guyamas* opens.

Point Sal.—From Point Arguello N. by W. $\frac{1}{4}$ W., and distant 19 miles, is Point Sal, which is marked by streaks of yellow sand, except at the extreme point. The extremity is formed by high, round, black rocks, off which are several sunken rocks, extending half a mile to the southward and westward. This stretch of the coast is very similar to that behind Concepcion and Arguello, but after passing Point Sal, the mountains fall back, and the shore is formed of sand-hills. The general trend hence is North, until the shore commences sweeping westward to form the bay of San Luis Obispo, and the shores become high and abrupt.

SAN LUIS OBISPO.—This bay is an open roadstead, exposed to the southward, and even during heavy N.W. weather a bad swell rolls in, rendering it an uncomfortable anchorage. The landing is frequently very bad, and often impracticable, but the best place is in the mouth of the creek, keeping the rocks at its mouth on the starboard hand. Fresh water may be

obtained at a small stream opening on the beach, half a mile West of the creek. In the coarse sandstone bluff between these two places are found gigantic fossil remains.

Off *Point San Luis*, which forms the S.W. part of the bay, are some rocks, and in making the anchorage vessels should give this point a berth of half a mile, passing in 6 or 8 fathoms. Run on a N. by E. course, and anchor three-fourths of a mile from shore in 6 fathoms, sticky bottom; 4 fathoms can be got about a fourth of a mile from the beach. In winter anchor far enough out to clear Point San Luis, if a south-easter should come up. During southerly weather landing is frequently effected at the watering-place when impracticable at the creek.

The distance of the rock off Point San Luis to the mouth of the creek is $1\frac{1}{2}$ mile; from the same rock to a white rock bearing N. 70° E. the distance is $2\frac{1}{2}$ miles; and a black rock lies halfway between the white rock and the mouth of the creek. The bluff on the East side of the small fresh-water stream West of the creek is in lat. $35^{\circ} 10' 37''$ N., long. $120^{\circ} 43' 31''$ W. It is high water (corrected establishment) at $X^h 8^m$; springs rise 4 ft. 10 inches; neaps 2 feet 5 inches.

The town of *San Luis Obispo*, which takes its name from the mission of that name, founded September 1st, 1772, is not on the bay, but is situated about 10 miles in the interior, in the middle of an extensive and excellent grazing country. Communication is maintained with San Francisco and other ports by regular steamers and lines of sailing packets.

The bay was discovered by Cabrillo in 1542, and called by him Todos Santos.

To the northward of the bay of San Luis Obispo the *Monte de Buchon* rises to a great height, which is readily distinguished in coming from the northward or southward.

The U.S. Surveyors were informed by old otter hunters on this coast, that there exists a sunken rock about 8 miles S.S.W. from Point San Luis, and furthermore that they had found kelp upon in 4 fathoms. On the old Spanish charts an island appears laid down in that direction, but distant about 8 leagues. One of the Pacific mail steam-ships laid-to in a S.E. gale, and thick fog off Point Concepcion, and, drifting to the northward, came unexpectedly upon a sunken rock, upon which the sea was breaking heavily. The commander supposed the vessel to be then off Point Sal, and had so plotted the rock upon his chart; but upon being informed of the alleged existence of a rock off San Luis Obispo, he was satisfied that he had been near it, but unfortunately had no opportunity of determining his position. This locality demands a thorough examination, as it is in the direct track of the whole California trade from San Francisco.

From Point San Luis the coast trends in a straight line W.N.W. for a distance of 8 miles, and close along the shore of this stretch are several

large rocks. Thence the coast trends abruptly to the North, running to the high conical rock called *El Moro*, distant 8 miles,—these two shores forming the seaward base of Mount Buchon.

From *El Moro* the shore-line gradually trends to the westward, thus forming a deep indentation or bay, called *Los Esteros* on the old Spanish charts, but now designated as the *Estero Bay*. It was discovered by Cabrillo in 1542, and here he obtained wood and water. Behind *El Moro* are several lagoons or streams, and the high land retreats for some distance, leaving the shore low and sandy, while the North shore is rugged and guarded by rocks. The N.W. point of the bay is called *Punta de los Esteros*, and bears N.W. $\frac{1}{2}$ N. from the West point of Mount Buchon, distant 13 miles.

From Point *Los Esteros* to the western point of the anchorage of San Simeon the coast runs nearly straight N.W. by W. for a distance of 15 miles. The shores are not so bold as to the southward and northward, and the mountains fall well back, leaving a fine rolling country of no great elevation, and well suited to agriculture.

BAY of SAN SIMEON.—This is a small exposed roadstead, but affords tolerably good anchorage during N.W. winds. The S.W. point of the bay bears N.W. by W. from Point *Esteros*, and is distant 15 miles. The indentation of the shore-line forming the bay trends between N.N.W. to N. for half a mile, and then sweeps away to the westward about $1\frac{1}{2}$ mile, gradually taking a S.E. direction. The land behind the bay is comparatively low and gently rolling, the high hills retiring well inland.

Vessels coming from the northward may run boldly round the S.W. point, within a few hundred yards of the shore, in 8 or 9 fathoms, round up to North, and anchor anywhere off the sand beach in 5 fathoms, hard bottom, and a little more than a quarter of a mile from shore. The beach is half a mile long, stretching well out, and rendering the landing disagreeable with any swell; but in such cases it is usual to land at the western part of the beach. Eastward of the sand beach the shore-line is bluff, and guarded with rocks. Vessels from the southward must make short tacks close inshore, or they will assuredly miss it. The only sure marks for it are the *Piedras Blancas*, as will be hereafter shown. It was in this bay that the steam-ship *Pioneer* put in, leaking badly. The bay affords not the slightest refuge in southerly weather.

In making this harbour from the northward, vessels must sight the *Piedras Blancas* (White Rocks) 4 miles W. $\frac{3}{4}$ N. of the S.W. point of San Simeon. They are two large white-topped rocks, and nothing else like them is found on this part of the coast. The geographical position of the outer and larger rock is, lat. $35^{\circ} 39' N.$, long. $121^{\circ} 15' West$. This bay is supposed by some to be the "Bay of Sardines" of Cabrillo, where he anchored and landed in 1542.

From *Piedras Blancas* the coast trends N.W. $\frac{1}{2}$ W. for a distance of 57

miles, in an almost perfectly straight line. At a distance of 18 miles from these rocks the above-mentioned bearing cuts a bold bluff and rounded point called *Punta Gorda*, off which, and for 2 or 3 miles along the shore northward, there are many rocks. This point is the Cape San Martin of Cabrillo. As there is one point under Cape Mendocino, more generally known as *Punta Gorda*, it is recommended that this point retain the name given to it by Cabrillo, especially as all his names have been cast aside.

Continuing on the same bearing, and at a distance of 49 miles from Piedras Blancas, is *Point Sur*, sometimes called *Lobos*, making out nearly half a mile. As seen from the North or South, at a distance of 11 miles, Point Sur appears as a large, high, round-topped island; but upon approaching it a low neck of land is seen, connecting it with the main. It is in lat. $36^{\circ} 19'$ North, long. $121^{\circ} 52'$ West.

The highest peak of the range bordering the coast lies 6 miles square in from Point Sur, and attains an elevation of 4,414 feet. Still continuing on the same bearing, 57 miles from Piedras Blancas, and $7\frac{1}{2}$ miles from Point Sur, another slightly projecting point is passed, about a mile to the eastward of the course. Thence the course trends more to the eastward, running N.N.W. for 8 miles to *Point Cypress*, and passing Point Carmel, the South point of Carmel Bay.

The mountains, which had fallen back behind Los Esteros, gradually approach the shore-line North of San Simeon, and about 10 miles North of Piedras Blancas; they came down abruptly to the coast, and run parallel with it to Point Carmel, forming the boldest and most compact shore that we have yet passed, and attaining a uniform elevation of nearly 4,000 feet. These mountains were called by Cabrillo the *Sierras Altas*, but at present the range is known as the *Sierra de Santa Lucia*. From their abrupt faces we have seen cascades falling from a height of 40 or 50 feet, directly into the sea.*

* On the opposite or eastern slope of the ridge is the valley of Salinas, through which the Rio Buenaventura flows. The hills are rendered much more fertile by their exposure to the fogs and mists of the coast, which supply them plentifully with moisture, and this is seen running in many rills down the hill sides.

The valley of Salinas is 50 miles in length, and has an average width of 6 or 7 miles; the valley descends to the N.W., and at its lower end is contracted by the hills through which the river passes, a low and well-wooded bottom being formed on each side. The whole of it is well drained, and admirably adapted for stock farms. It may be called an open country covered with grass; the tops of the hills are covered with oaks, pines, and cedars.

The river having passed through a narrow range of hills, the valley again opens and now receives the name of La Soledad, which is 20 miles wide, and extends to the Bay of Monterey. The land on either side rises into undulating hills, and from these into mountains,

CARMEL BAY.—Between Point Carmel and Point Cypress, which are about 3 miles apart, lies the small, rocky and unsafe bay of Carmel. At the southern extremity is a small cove, sufficiently land-locked and protected for small vessels. In the vicinity there is an extensive quarry of granite, and several small coasting vessels are employed for its transportation to San Francisco, but there is so little space that they are compelled to warp in and out by buoys placed at the entrance. Point Cypress, the North point of the bay, is low, and covered with cypress to the water, and is the first wooded point met with in coming from the southward. The upper branches of the trees are spread out by the influence of the strong prevailing winds, and present a flat umbrella-like appearance.

The *Mission del Carmelo* is situated but a short distance from the shores of the bay, and can be seen from the water in certain directions. From Point Cypress to Point Pinos the general direction of the shore is N. $\frac{1}{2}$ E., and the distance 4 miles.

POINT PINOS makes out as a low rounding point, bringing the pines, with which it is covered, within a quarter of a mile of the shore, off which the rocks make out a quarter of a mile, and the line of 3 fathoms nearly half a mile, when the depth suddenly increases to 10 or 15 fathoms, and at a mile reaches 40 or 45 fathoms. The 3-fathom line follows the shore within a third or half a mile into Monterey, whilst outside of that line the depth increases as suddenly as off the point. Vessels should always give Point Pinos a good berth, as a very heavy swell almost invariably sets upon it. This point is the northern termination of the long and elevated range, called Sierra de Santa Lucia, extending southward, and forming the bold rocky coast-line to San Luis Obispo.

The **Lighthouse** is a secondary sea-coast light, situated upon the N.W. part of Point Pinos, at the face of the growth of pines. The building is of grey granite, and shows a *fixed light* of the natural colour, elevated 91 feet, and seen from 14 to 17 miles off. It is in lat. $36^{\circ} 37' 58.1''$ N., long. $121^{\circ} 55' W.$, or in time $8^h 7^m 40.0^s$.

BAY OF MONTEREY.

Point Pinos forms the S.W. point of this bay, and Punta de la Santa Cruz (forming the western shore of the anchorage of Santa Cruz), the N.W. point. A line joining these two points runs N. $27^{\circ} W.$ $19\frac{1}{2}$ miles, and the greatest width of the bay, near the mouth of the Salinas River, is $9\frac{1}{2}$ miles.

From Point Pinos to the anchorage off the town of Monterey the course is

some 2,000 feet high. The valley of L. Soledad is considered very fertile, the plains affording large areas of arable land, while the hills are covered with grass and groves of oak, and the mountains with trees of higher growth.

E. by S. $\frac{1}{2}$ S., and the distance 3 miles. The shore towards the town is rugged, composed of granite, and covered with a heavy growth of fir; but to the eastward of the town is a long sandy beach, backed by sand dunes of slight elevation. For a distance of 10 miles along this beach the line of 3 fathoms lies at a distance of 150 yards off shore, the water deepening rapidly beyond that, and the bottom almost everywhere hard.

Vessels coming from the northward bound to Monterey, follow the coast from Point Año Nuevo to Point Santa Cruz, then run well into the bay, but not too far, for fear of losing the wind, and to avoid the set of the heavy swell rolling towards the beach. Leaving Point Santa Cruz, and keeping on a S.E. by E. course about 15 miles, will bring vessels into 25 fathoms, and nearly 2 miles from the beach; thence a South course for 8 miles will bring them to the anchorage in 10 fathoms, and half a mile from the landing. These precautions are necessary, because Point Pinos, with the whole bay, is almost continually enveloped in a dense fog. Very frequently the coasting steamers have to run for the beach, and then be guided by the route to the anchorage.

A direct course from Point Año Nuevo to the anchorage is S.E. $\frac{1}{2}$ E., and the distance $36\frac{1}{2}$ miles. From Point Pinos to Point Año Nuevo the bearing is N. 47° W. and the distance 34 miles.

By anchoring well in at the western side of the anchorage, vessels will avoid much of the swell that comes in with the heavy N.W. winds, but never sufficient to make any berth there dangerous. In heavy southerly weather Point Pinos breaks the swell, but the wind draws very strong over the anchorage. The water shoals from 15 to 3 fathoms in a distance of 300 yards, and the lead should be used to avoid running in too far.

When the California mail steam-ships stopped at Monterey they frequently ran outside of Point Pinos, or in very dangerous proximity to it. The end of the wharf abreast of the custom-house at Monterey is (approximate) lat. $36^{\circ} 36' 17''$ N., long. $121^{\circ} 52' 27''$ W.

The town of Monterey presents a very pretty appearance as seen from the water. Immediately behind it the country rises in plateaus, diversified with hill and valley, and beautifully dotted by oak groves. It was the capital of California while under the rule of Mexico, and for some years after it became a state. The whale fishery* has been vigorously pursued at Monterey, during the season, which usually lasts nine months, from March to Novem-

* La Pérouse says, "I cannot express the number of whales with which we were surrounded, nor yet their familiarity; they blew every half minute within half pistol shot of our frigate, and occasioned a very strong smell in the air. We had not known of this effect from whales, but the inhabitants told us that the water they spouted was impregnated with this unpleasant odour, and that it extended to a considerable distance."

Many whales were also seen by Sir George Simpson, in 1842, the bay being a favourite

North Pacific.

ber. Regular communication is kept up with all parts of the coast by steamers and sailing vessels. Stages communicate with Santa Cruz, and all the towns to San Francisco.

Following the shore from the town of Monterey, northward, it presents a uniform sand beach, running nearly North, backed by low dreary sand dunes, producing sparsely the coarsest grasses and bushes, and entirely destitute of fresh water. This waste extends to the Salinas River, of which we reach the great bend at about $9\frac{1}{2}$ miles from Monterey, and only 100 yards from the beach. From Point Pinos it bears N. 30° E., and is distant $8\frac{1}{2}$ miles. From this bend the river follows the line of the beach, just inside of the low sand dunes, for a distance of $4\frac{1}{2}$ miles, and there disembogues. From Point Pinos it bears N. 18° E., and is distant $12\frac{1}{2}$ miles. This river has been designated by a variety of names, as Buenaventura, Monterey, and Salinas, but it is now generally known by the latter. From its mouth, which is only 60 yards wide at low water, to the entrance to the *Rio del Pajaro*, or San Antonio, the distance is $2\frac{1}{2}$ miles, the shore trending to the N.N.W. The entrance of that river bears N. 11° E., 14 miles from Point Pinos. From here the coast runs N.W. nearly straight to *Atos Creek*, a distance of 7 or 8 miles, and about 6 miles E. by N. of Santa Cruz, with the shore rocky and abrupt.

North of the Salinas River commence rich meadow and table lands, affording to the settler spots unsurpassed for productiveness, even in the prolific state of California. A remarkable submarine valley, similar to that off Point Hueneme, has been discovered, and to some extent traced out in this bay. The head of the valley is five-eighths of a mile South of the mouth of the Salinas River, and the 20-fathoms line is only a quarter of a mile off the beach, the depth increasing to 50 fathoms in the next quarter of a mile. At this distance from shore the 20-fathoms lines are three-eighths of a mile apart. The general direction of the valley for the next 2 miles is S.W. $\frac{1}{2}$ W., where we find a depth of 117 fathoms, and the 50-fathoms lines lie about five-eighths of a mile apart; thence the valley runs about West, reaching a depth of 170 fathoms in a mile, and 240 fathoms in $3\frac{1}{2}$ miles with 42 fathoms less than a mile to the North of this. The soundings are not numerous enough to trace its outlines in deep water, but the indications are, that for 10 miles of its length it runs S. 60° W., with no bottom at 315 fathoms. The only available boat landing upon the beach of the bay shores is at the head of this submarine valley. There are no indications on the

resort of that animal; the shark, the cod, and the sardine also abound: the last is sometimes thrown in millions on to the beach by westerly gales.

The whale has been known to burst among his human persecutors with the report of a cannon, and almost to suffocate them with the stench.

land of this peculiar formation, except that at its head the bay very gradually reaches its greatest easting.

The extensive valley, called the *Salinas Plains*, through which comes the Salinas River, extends inland from the eastern part of Monterey Bay. It has been before alluded to on page 175 (*note*).

SANTA CRUZ HARBOUR.—This harbour or anchorage is at the N.W. part of the Bay of Monterey, and is of very limited extent. It is protected from all the winds from the northward, but exposed to the full sweep of the southerly gales, and many coasters have been driven ashore during the winter season. It is about three-quarters of a mile in depth northward, by $1\frac{1}{2}$ mile E. and W.

Vessels coming from the northward, after leaving Point Año Nuevo, follow the coast line on a general course E.S.E. for about 18 miles. The shore for this distance is abrupt, jagged, and moderately elevated, with a range of high hills, or mountains, whose summits in summer all almost continually enveloped in fog. Skirting the shore at a distance of half a mile, a depth of from 6 to 10 fathoms can be carried; and upon making Point Santa Cruz, the top of which is moderately level for some distance back, 4 fathoms are obtained within a quarter of a mile of it; round up and run along in 5 fathoms until abreast of the beach, where good anchorage will be found half a mile from the shore. Vessels from the South in summer keep well into Monterey Bay, to escape the full force of the north-westers and the heavy head sea.

During the winter months anchor well out, so as to be able to clear the shore westward of Point Santa Cruz, in case a south-easter springs up.

Landing on the beach is generally disagreeable, as it extends out some distance, but boats usually land at the embarcadero, at the foot of the bluff, in the N.W. part of the harbour. The beach is over half a mile in length, and between its eastern extremity and the bluff point empties the San Lorenzo River, a small stream running past the town and mission, which is situated a mile inland.

The country about Santa Cruz is exceedingly productive, and now thickly settled. A steamer runs regularly in the trade between this place and San Francisco, and numerous coasters find abundant freight from here and the Pajaro country to San Francisco.

The high mountain, N. 25° E., $12\frac{1}{2}$ miles from Santa Cruz, is named *Mount Bache*, and is 3,791 feet high.

It is high water here at $10^h 18^m$; springs rise $5\frac{1}{2}$ feet; neaps, 2 feet 10 inches.

From Point Santa Cruz to Point Año Nuevo the distance is 18 miles, and the general direction W. by N. $\frac{3}{4}$ N., at first curving to the south-westward of that course, and then to the northward, until within three miles of the rock of Point Año Nuevo, when the shore curves well to westward (for the

last mile to the S.W.), forming an anchorage protected somewhat against the heavy swell from the N.W., and having a depth of 5 fathoms within less than half a mile from the shore, and from 10 to 15 fathoms at the distance of a mile.

Point Año Nuevo.—At a quarter of a mile from the point lies a black jagged islet, consisting of a sloping ledge of rocks covered with a stratum of yellow clay about 4 feet thick, and this again covered with a mound of sand about 30 feet high. Upon this a *lighthouse* is to be built. The point itself is composed of rolling hills of shifting sand, varying from 20 to 100 feet in height, while behind them rises the Santa Cruz range of mountains. The coast trail which followed the beach from the southward here strikes up the hills behind the sand dunes. Steamers coming upon the coast from the southward in thick weather, always endeavour to make the land near Point Año Nuevo, and then follow the coast to the San Francisco bar.

From Point Año Nuevo, the coast runs N.W. $\frac{3}{4}$ N. for about 10 miles to the rocky point called the *Punta de la Balsa*, but designated Point Miramontes, on the coast survey reconnaissance sheet, in 1853. The high mountain square, in from La Bolsa, bearing N. 53° E., and distant 13 miles, named *Black Mountain*, attains an elevation of 2,809 feet. Two miles North of La Bolsa empties the *Piscador*, a small stream running through a valley of inconsiderable extent. For the foregoing 12 miles, the general formation of the immediate seaboard is that of a table land of three terraces, the lowest gradually sloping from the base of the second to the coast which is exceedingly rocky and forbidding. The underlying stratum is sandstone.

From Point Año Nuevo to *Pillar Point* or *Punta de Corral Tierra*, forming the southern and western point of Half-moon Bay, the general direction is N.W. by N. $\frac{1}{4}$ N., and the distance 25 miles. Three miles and a quarter above the *Piscador*, opens the *San Gregorio*, another small stream, and $2\frac{1}{2}$ miles still further, opens the *Tunitas*. The seaboard between the valley of the *Piscador* and that of the *San Gregorio* undergo a striking change both in the character of its topography and its geology. Instead of the table-land we meet with a spur of the coast mountains running into the sea, and having an elevation of 600 feet within a mile of it. The shore line and the coast generally present a very rugged and broken appearance, occasioned by the deep gulches cut through to the ocean.

HALF-MOON BAY.—This anchorage is S.S.E. from Point San Pedro, and 18 miles S. by E. from the Golden Gate. The south-western point of the bay is formed by a bluff table-land, about 160 feet in height, called the *Corral de Tierra*, 325 yards South of which stretches a number of black rocks, which show as one when seen coming up the coast; but as three or four when approached from the N.W. The largest is nearly as high as the bluff, and locally known as *Sail Rock*, or *Pillar Rock*. The point is known as

Pillar Point, and from its south-eastern extremity rocky and foul bottom, marked by kelp, extends S.E. $\frac{1}{2}$ E., seven-eighths of a mile, dropping suddenly from 14 feet to 5 fathoms. This is the inner reef, and makes the bay available as a summer anchorage. One mile and three-quarters S.E. from the same part of the point, a narrow ledge of rocky bottom, one-third of a mile long, and marked by kelp, stretches in the same general direction. The passage between this outer and the inner reef is three-quarters of a mile wide, with rocky and uneven bottom, from $3\frac{1}{2}$ to $10\frac{1}{2}$ fathoms. These ledges lie parallel with the coast mountains, and with the shore line, from which the outer one is distant $1\frac{3}{4}$ mile. From the eastern extremity of the point the shore runs N.W. by N. for a quarter of a mile; then N.E. for three-quarters of a mile, curving to the eastward and south-eastward in a long bend for $2\frac{1}{2}$ miles to the mouth of the *Arroyo de los Pillarcitos*, down which comes the only road crossing the peninsula of San Francisco, between the Laguna de Mercedes and Santa Cruz. The highest part of this road, which crosses a depression of the peninsula, is near the coast survey station ridge, which is 1,093 feet above the ocean, and but a few feet higher than the road. The outer reef is nearly abreast of the Pillarcitos, from which the coast runs South 4 miles to *Miramontes Point*, which is S. 48° E., 5 miles from Pillar Point, thence to the mouth of the Trinitas the distance is 4 miles S.E. The greatest extent of the bay may be said to be between Pillar and Miramontes Points; but the part near the former only is available.

The soundings between the rocky ledges and the shore are quite regular, decreasing from 9 to 3 fathoms, at less than a quarter of a mile from the beach, with sandy bottom. The passage to the anchorage is between the inner and outer reef, with the high, bare-topped mountain bearing a little North of East, and Pillar Point open to the westward. This mountain is steep, with straggling redwoods on its flanks, and the summit bare. It is locally known as *Bald Pate*; but on the Spanish grants as *Cumbre de las Auras*. When inside the reefs, beat up until Pillar Point bears about S.W., distant half a mile, and anchor in $4\frac{1}{2}$ fathoms, hard sand. With southerly light winds a heavy swell sets in; but upon the approach of heavy S.E. weather, it is necessary to go to sea.

The mass of redwoods cresting the mountains of the peninsula cease abruptly abreast of Miramontes, and only stragglers are seen to the northward. They are a good mark for recognising this part of the coast when coming in from sea.

Around Half-moon Bay is a limited extent of agricultural country at the seaward base of the mountains, and small coasters carry the produce to San Francisco.

About one mile along the coast to the north-westward is a small boat harbour, 100 yards wide, formed and protected by outlying rocks, and having $3\frac{1}{2}$ fathoms in it. In the autumn months it is used as a whaling station.

About a thousand gallons of humpback oil were obtained in the fall of 1863.

Point San Pedro lies N.W. by N. $\frac{1}{4}$ N., 30 miles from Point Año Nuevo, and S. 12° E. from Point Lobos, at the entrance to the Golden Gate. It is a black, bold, rocky promontory, over 500 feet high, having a high, large, jagged rock at the northern part, and is a prominent and excellent mark for making the entrance to San Francisco. The principal rock is nearly 100 feet high. Its South face is white, and shows the line of stratification plainly. From the West the dip of the strata shows about 60 degrees to the northward. It is connected with the main by some low rocks. Half a mile to the N.E. of the point is the valley of San Pedro, from which the point takes its name. From Point San Pedro the bell-boat off the bar of San Francisco is distant 12 miles, and from Point Año Nuevo it is 40 miles upon a N.W. by N. course.

The range of mountains forming the north-eastern shore of Monterey Bay, and extending to Santa Cruz and Point Año Nuevo, is called Santa Cruz. Thence northward to the Golden Gate, and forming the peninsula of San Francisco, by bounding the bay on the West, the mountains are known as the San Francisco or San Bruno range.

SAN FRANCISCO.

The port of San Francisco was discovered as late as the year 1769, and that, too, not by the obvious mode of such an expedition, but by one overland. Perhaps one reason why it had been so overlooked by other navigators is, that its narrow entrance is so frequently hidden by fog. In 1767, when the Jesuits were replaced by the Franciscans, the Viceroy of Mexico, the Marquis de Croix, finding that England and France were taking an interest in these countries, as evidenced by the expeditions of Cook and Bougainville, and that Russia, too, was steadily progressing from the North, proposed to the ecclesiastics the colonization of this territory. Accordingly it was divided into districts, and missions were planned for San Diego and Monterey, the only two ports then known to exist in the upper province. Three vessels were despatched from San Diego, but were eminently unfortunate, from the fact that the N.W. or opposing winds blow during three-fourths of the year. Under these circumstances the remainder of the distance was undertaken by land, and though the explorers did not recognise what is now Monterey, they made the far more valuable discovery of the inland sea to which the name of the patron saint of their order, and of sailors in general, was given.

The mission was founded, and its progress had but comparatively little to

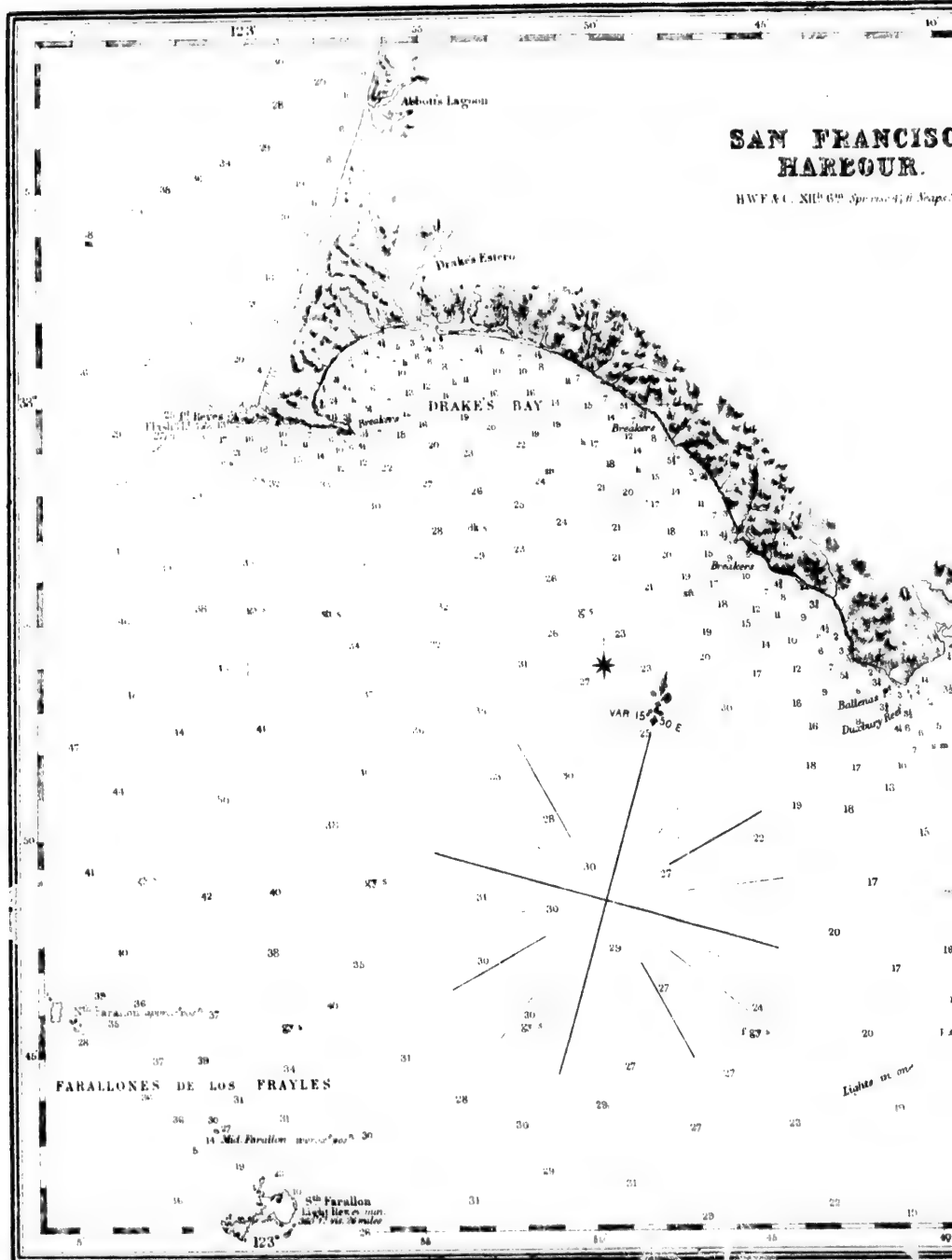
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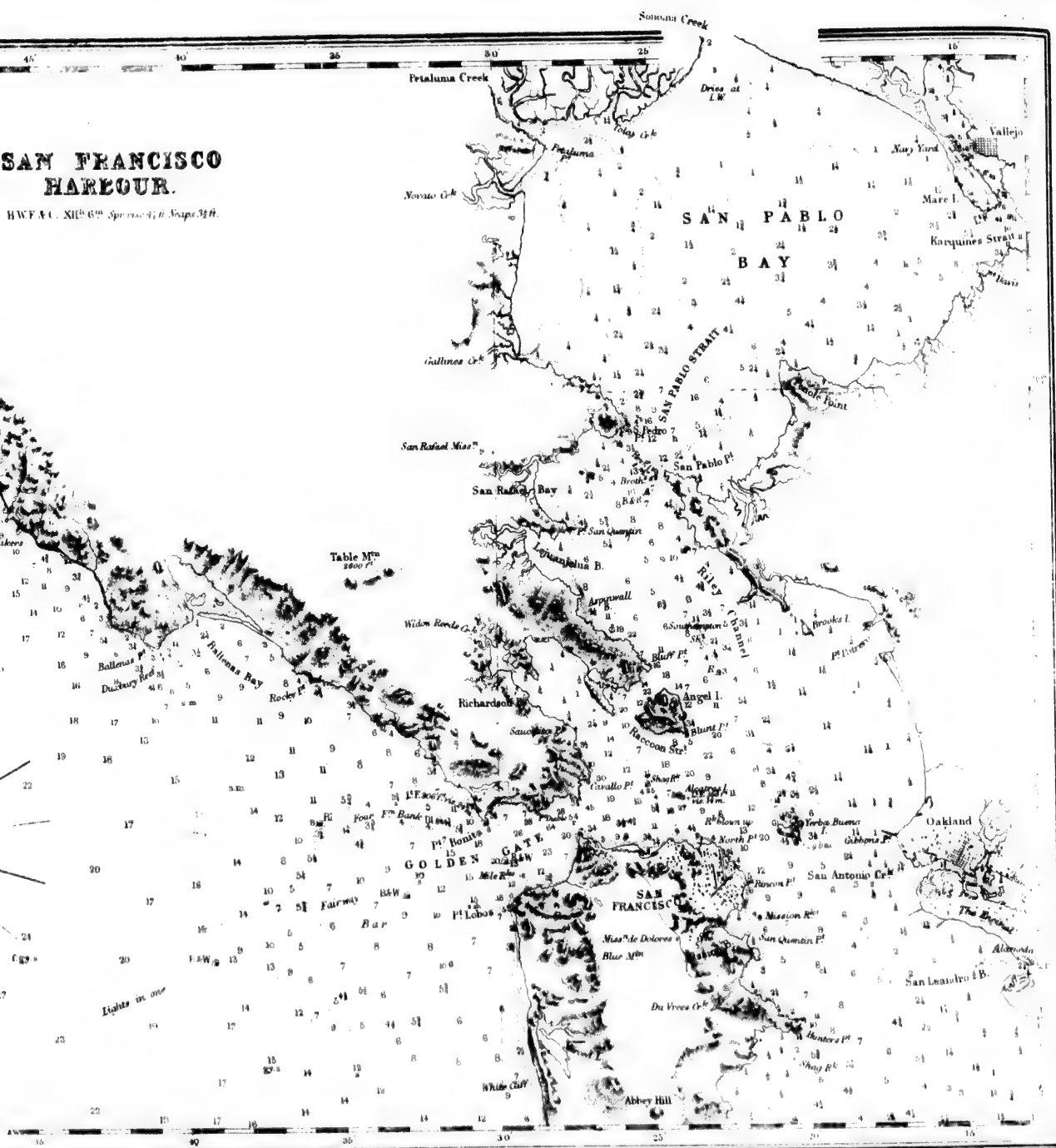
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SAN FRANCISCO HARBOR.

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do with the external world, and this little commercial importance was all but annihilated by the revolution in 1836.

When Captain (afterwards Rear-Admiral) F. W. Beechey surveyed the harbour in 1828, the place had but a few wretched adobe houses at Yerba Buena, occupied by indolent half-breeds, with not the slightest indication of the wonderful capabilities which were soon after to be developed. History affords no example of such a sudden rise in importance as California. Scarcely a month had elapsed since its annexation to the United States before the gold discovery by Captain Suter and others was made, and very soon after the desolate harbour of San Francisco became crowded with shipping, bringing an immense influx of gold seekers, and the ships, three or four hundred in number, laid there, deserted by their crews, and in some cases by their captains also. But this influx of people has left behind it the permanent advantages of a settled population, and there can be no doubt but that San Francisco, the Queen of the Pacific, is destined to be one of the most important centres of civilization and commerce that the world possesses.

Besides the immense territory of which it is the commercial and political capital, and its vast powers of production, it will command the commerce of the North-east Pacific, and with it also that between the United States and China, Japan, &c., and the numerous lines of immense steamers which now sail to and from this port as a centre is one of the wonders of the present century. This commercial importance will be enormously increased by the Pacific railroad, completed in an unparalleled brief period at the end of 1869;* so that but a very few days will suffice to connect this most remote part of the world with European trade and travel. In 1867 its population amounted to 131,000, and it was the tenth in order of amount of population in the cities of the Union.

San Francisco is ill placed, as far as mere building facilities are concerned. When the first houses were built in 1848 and 1849 they stood on a strip of beach around the Cove of *Yerba Buena*, and at the foot of the steep and lofty sand-hills. Dunes and cove have disappeared together; the hills have been shot bodily into the bay, and the former harbour is now the business quarter of the city. One great danger on this coast all its cities share in common: three times within the present century the spot on which San Francisco stands has been violently disturbed by subterranean forces.

The Contra Costa range is unbroken but by the single gap of the Golden

* The act creating the Pacific Railroad Company passed in 1862; the company were bound to complete their line at the rate of 100 miles a year. They completed it at more than three times that rate, at 2 miles per day at one end and 1½ mile at the other. A good account of the progress of this marvellous undertaking is given in Dr. Bell's "New Tracks in North America," 1869.

Gate, and through this opening the cold winds rush in a never-ceasing gale, spreading fan-like as soon as they have passed the Narrows. Hence it is that the Golden Gate is called the "Keyhole," and the wind the "Keyhole Breeze." Up country they make it raise the water for irrigation. In winter there is a calm, and then the city is as sunny as the rest of California.—(Sir) C. Wentworth Dilke, *M.P.*, 1868.

Although the entrance is easy, facilitated as it is by the excellent lights and buoys which define its prominent points, or point out its few dangers, we give unabridged the directions drawn by the U.S. coast survey officers in 1862, modified, of course, by the changes which have since been made.

The GOLDEN GATE is the entrance to the bay, and presents the character of a great cleft or fissure in the sea-coast range of mountains, thereby connecting the Bay of San Francisco with the Pacific Ocean. In approaching it is difficult to imagine that a deep channel lies ahead, so clear is the atmosphere and so well defined the Contra Costa mountains behind the bay. Both shores are bold, broken into points, and rocky; but the northern is much the bolder, rising almost perpendicularly from the water, attaining an elevation of about 1,000 feet, but a short distance back, and in 7 miles rising to 2,600 feet. On the South side, between the points, are stretches of low beach; the hills are undulating and of moderate elevation, increasing very gradually in altitude to the southward, and reaching a height of 1,250 feet in about 6 or 8 miles. The chart of San Francisco entrance, which accompanies the annual coast survey report for 1856, shows the bold and characteristic topography of the vicinity of the Golden Gate.

Point Boneta.—The North head of the entrance is formed by this Point; a narrow, precipitous, rocky cape, nearly 300 feet high, and stretching from the lighthouse about half a mile to the S.E. Behind it the mountains rise rapidly to an elevation of 1,500 feet. During the dry season the deposit of sea birds accumulates in such quantities on the ridge outside of Boneta lighthouse, as to make the bluff show white, but the first heavy rain carries it off, and then throughout the rainy season the point exhibits its natural appearance. There are no dangers off the point, the line of three fathoms rarely extending 300 yards from any portion of it. When the clipper ship *San Francisco* was lost on this head, we are told that she first struck the bluff inside the heads; was carried by the currents around the point, and then cast ashore on the outside. From 5 to 6 fathoms can be found on every side within a fifth of a mile of the point.

The Lighthouse is situated nearly half a mile from the extremity of the point, and consists of a brick tower painted white, and surmounted by a lantern painted black. From seaward it is seen projected against the dark, high hills behind it, and in clear weather is a very plain object. Lat. $37^{\circ} 49' 10.0''$ N., long. $122^{\circ} 30' 50.3''$ W., or, in time, $8^h 10^m 3.4^s$. From the light

at Point Boneta to that on Fort Point, the distance is $2\frac{3}{4}$ miles, and bearing E. $\frac{1}{4}$ N.

The *fog bell* on *Point Boneta* is in a frame building, just in advance of the lighthouse, at an elevation of 270 feet. The bell weighs 1,500 pounds, and during foggy and thick weather is struck six blows, at intervals of 16 seconds each, followed by a pause of 44 seconds.

POINT LOBOS.—The South head of the entrance to San Francisco Bay is formed by this point, 375 feet high.

A *fog bell* is (or was) kept in operation by private enterprise. Upon the round-topped hill behind the point is erected a large frame building for a telegraph station, whence the electric wires run to the City of San Francisco. The first telegraphic message transmitted on the Pacific coast was over these wires. Southward of the head the sand dunes are conspicuous, and easily recognised features in approaching the entrance. The strong N.W. summer winds, drawing in over the land, raise the white sand from the three miles of broad beach, and carrying it inland over the hill-tops, bury grass, bushes, and scrub oak. The quantity of sand driven in from this beach is enormous, and its accumulation has greatly modified the topography of the peninsula.

Off the western face of Point Lobos lie a number of black, jagged rocks, about 50 feet high, but all within the 5-fathoms line, and close in-shore. They are called *Seal Rocks*, and one of them shows a large arch from particular directions. The outer one bears from Point Boneta S.E. by S. $\frac{1}{4}$ S., and is distant $2\frac{1}{4}$ miles. From it the general trend of the shore runs in a line to Fort Point for nearly a mile, to a short jutting high point, off which lie the Mile Rocks. From this point the shore runs well to the eastward for a mile, gradually trending to the North for a mile and a half to Fort Point. In the deepest part of this bend the shore is low, with small hillocks rising from the general surface and slope of the hills, and fronted by a long sand beach.

Mile Rocks.—These two rocks lie off Point Lobos, a short distance within the limit of the entrance of the Golden Gate. They are small, near each other, and have a height of 15 feet above water, with a good depth of water all around and close to them; but the current twirls and eddies them about in such a manner as to render a near approach anything but agreeable or safe with a light wind. The inner and smaller rock is one-third of a mile to the northward of the small jutting point inside of Point Lobos, and very nearly 2 miles S.W. $\frac{1}{4}$ S. from Fort Point. Vessels running in on the line of Fort Point and Alcatraz Island, pass less than half a mile from the outer and larger rock. The rocks bear almost S.E. from Boneta light, and distant $1\frac{1}{2}$ mile. They were called "One Mile Rocks" by Beechey, in November, 1826.

Fort Point.—This was formerly a bold, narrow, jutting promontory of

hard serpentine rock, 107 feet above high water, and surmounted by a small Mexican fortification, called Fort Blanco. The view from the point was one of the finest in the harbour; but the whole headland has been cut down to within a few feet of high water, and increased in area to form a large fortification. Upon the hill side rising behind it are houses for the accommodation of the commandant, officers, soldiers, and workmen. Eastward of the point is a long substantial wharf, constructed for receiving stores, ordnance, &c. Several large vessels have been lost on Fort Point, by venturing too close during light airs and strong irregular currents.

The Lighthouse on Fort Point is a wooden building, painted white, and situated outside of the fortifications, showing a *fixed light* at 52 feet, which can be seen 12½ miles off. The South Farallon light is visible from a vessel's deck when abreast of Fort Point. The *fog bell* at Fort Point is on the eastern side of the lighthouse, and almost touching it. The bell weighs 1,092 pounds, and during foggy or thick weather is struck by machinery five blows at intervals of 10 seconds, followed by a pause of 34 seconds.

The Bar off the entrance to the Bay of San Francisco, has a depth of 5 fathoms at the lowest tides. Its general form is that of a horseshoe, commencing 4 miles southward, stretching out gradually to 6 miles abreast of Point Lobos: and when nearly up to the parallel of Point Boneta, running in shore towards that point, and forming the "Four-fathoms Bank," from a distance of 4 miles down to 1. The average breadth of the bar within the limits of the 6-fathoms curve is about one mile. It falls off outside to 10 fathoms in half a mile, and deepens gradually inside. Not less than 5 fathoms exist over the bar, when Point Boneta light bears between N.E. by E. ½ E., and N. by W. ½ W.

No vessel should anchor on the bar if she can possibly avoid it; frequently a heavy swell sets in without wind, and if the current is running strong ebb, it allows little chance of escaping from an uncomfortable berth.

The flood-tide makes on the bar about 61 minutes earlier than at San Francisco.

It has been given as a rule for steamers approaching in thick weather, to run for the bar as nearly as they can estimate, keeping the lead going until they strike 5 fathoms, and run on until the depth is increased, when the armed lead should bring up gray sand with red specks, and they may conclude themselves within the bar. Recently it has been intimated that these peculiarities of bottom exist also outside of the bar.

The fog sometimes stands like a wall, outside of a line from Fort Point across the entrance, while the bay inside is beautifully clear. After the greatest heat of the day is past, this fog creeps in and envelopes land and water.

Buoy on the Four-fathoms Bank.—A first-class can buoy, with red and black horizontal stripes, is placed at 4 fathoms at mean low water, near the

western and seaward end of the "Four-fathoms Bank" lying off Point Boneta. The following bearings and distances will give its position. It is on the prolongation of the line from Fort Point light to the extreme point of Boneta. Point Boneta light bears E. 13° N., distant $3\frac{1}{2}$ miles. Outer telegraph station on Point Lobos bears E. 13° S., distant $5\frac{1}{2}$ miles. The highest part of the western ridge of Table Mountain bears N. 13° W. There is a spot having but $3\frac{1}{2}$ fathoms upon it outside this buoy, bearing S. 34° W., and distant seven-eighths of a mile.

The shores of the Golden Gate.—On the North side of the Golden Gate the shores are very precipitous, with an occasional short stretch of sand beach at the base of the bluffs, affording a boat landing. *Point Diablo* is the first point inside Boneta, and bears N.E. by E. $\frac{3}{4}$ E., distant $1\frac{1}{2}$ mile from it; between these the shore is indented about three-quarters of a mile, affording a boat landing during smooth weather for the lighthouse people. In the vicinity of Point Diablo the faces of the cliffs show of a reddish purple colour. The red specks found on the bar are doubtless derived from the disintegration of these reddish cliffs.

From Point Diablo the shore is jagged and irregular to *Lime Point Bluff*, 495 feet high, distant one mile, and bearing N.E. $\frac{3}{4}$ E. Off this point are several high rocks, but they are so close to the bluff as to be distinguishable only from certain directions. From Lime Point Bluff to Fort Point the distance is barely a mile, and the bearing S. by E. $\frac{3}{4}$ E. This is the narrowest part of the Golden Gate. Thence the bay begins to open well to the N.E.

On the South side, eastward from Fort Point, the shore is low, flat, and marshy, to *Point San José*, distant $2\frac{1}{2}$ miles, and bearing E. by N. This point is moderately high, with a few houses clustering upon it, and is locally known as *Black Point*. Off this reach was the "outer anchorage" of former navigators, and the Presidio of San Francisco is seen a short distance behind it.

From Point San José to North Point, at the base of Telegraph Hill, the distance is one mile, and the bearing E. $\frac{3}{4}$ N. All this space forms part of the city of San Francisco, and is covered with houses. The shore here is denominated the *North Beach*, and from about the middle of the lowest part projects a long wharf over the flats to 3 fathoms water. This has naturally caused a great deposit around it, and now only $4\frac{1}{2}$ feet of water can be obtained at the N.W. part of the wharf at mean low water.

Telegraph Hill rises to a height of 301 feet above the mean level of the bay, and is covered with houses to its summit wherever building room can be obtained. The present plan of the city grades contemplates the entire removal of this hill.

ALCATRAZ ISLAND and Light.—This is the first island that is opened in entering the Golden Gate, and upon it is erected a lighthouse. The island is nearly 600 yards long, in a W.N.W. direction, by about 260 in width,

and rises to an elevation of 135 feet above high water. The summit is flat, falling away gently on all sides for some distance, and then at the sides dropping perpendicularly. Deep water marks exist all round the island, and, with the exception of one or two places, the sides are so steep that a landing is effected with difficulty. Extensive fortifications are constructed upon it. At the S.E. side a small pier has been built to receive stores, ordnance, and materials. Off the N.W. part foul bottom makes out about 300 or 400 yards.

The lighthouse is built on the summit of the island, and bears N.W. from Telegraph Hill, distant $1\frac{1}{2}$ mile; from Fort Point N.E. $\frac{3}{4}$ E., distant $2\frac{1}{2}$ miles. The light is a *fixed harbour light*, illuminating the entire horizon. It is 160 feet above the level of the sea, and should be seen from the sea at a distance of 14 miles.

The frame-work supporting the *fog bell* is built on the south-eastern extremity of the island, close to the water's edge, and is struck by machinery four blows at intervals of eight seconds, followed by a pause of fifteen seconds.

No hidden dangers have been discovered in the entrance outside of the line from Fort Point to Lime Point Bluff, but there are several inside.

Presidio Shoal, having $3\frac{1}{2}$ fathoms upon it, lies $1\frac{1}{2}$ mile inside of Fort Point, and bears N.E. by E. $\frac{1}{4}$ E. from it, or three-quarters of a point eastward of the line between the lights on Fort Point and Alcatraz Island. The shoal is about 700 yards long within the 4-fathoms curve. It is very narrow, shows sandy bottom, and has deep water all around it. Its general direction is on the above mentioned bearing. From the shoalest part the Presidio flagstaff bears S. $\frac{1}{2}$ E.

Anita Rock shows above water at low tides, and is situated $1\frac{1}{2}$ mile inside of Fort Point, and bears E. by N. from it. It is only 300 yards from the low beach, and has deep water close around it.

A spar buoy, painted red, with even numbers, has been placed in 3 fathoms water, about half a cable's length due West from the shoalest part of Anita rock. Vessels should not approach this buoy within a cable's length, as a strong current sets across the rock. It was named after the United States quartermaster's barque *Anita* that struck upon it.

Bird or Arch Rock is a small pyramidal rock, about 45 feet in diameter, 30 feet high, and bearing W. $\frac{3}{4}$ S., distant seven-eighths of a mile from the lighthouse on Alcatraz Island. When seen in the direction from or towards the Presidio Shoal, it presents a perforation at low tides.

Shag Rock is a low white-topped rock, about half a mile N.N.E. from Bird Rock. From Alcatraz light it bears W. by N., distant 1 mile. For about 300 yards towards Alcatraz Island the bottom is foul and irregular, but outside that limit 10 fathoms are found. The rock shows about 4 feet above the highest tides, being then not more than 8 or 10 feet in extent.

Blossom Rock is a ledge having 5 feet water upon it at the lowest tides, and within the 3-fathoms curve is about 300 by 200 yards in extent, with deep water outside those limits. A spar buoy, painted with red and black horizontal stripes, has been placed in 4 fathoms water, about half a cable's length due South from the shoalest part of the ledge. Vessels should not approach this buoy from any direction nearer than a cable's length. This ledge bears E. by S. from Alcatraz light, and $1\frac{1}{4}$ mile distant, being almost on the line joining the South points of Alcatraz and Yerba Buena Islands. From the summit of Telegraph Hill it bears N. 6° W., distant one mile. It was discovered, and named by Capt. Beechey, R.N., after his ship, in November, 1826.

YERBA BUENA ISLAND is the large high island opened to the East and South of Alcatraz, after entering the Golden Gate. The western point of this island is $1\frac{1}{4}$ mile from Telegraph Hill, and the bearing N.E. by E. Its peak is 343 feet high; the sides steep and irregular, and rising to a ridge running nearly East and West. On the western or San Francisco side the water is very deep close in shore, but from the N.W. point a 3-fathoms bank extends $1\frac{1}{4}$ mile N.W. by N., spreading to the eastward for half a mile, and thence running to the N.E. point. The wreck of the ship *Crown Princess* lies in 5 fathoms on the western edge of this bank, and a day mark painted red has been attached to her, consisting of a plank 7 inches by 3 inches, 30 feet long, showing 15 feet above high water, with a board 5 feet long nailed across just below the top. In early times this island is said to have been densely covered with wood, and was known to navigators and whalers as Wood Island. Now it has but a few scrubby trees.

ANGEL ISLAND.—When passing through the narrowest part of the Golden Gate, this large island bears about N.N.E., and is seen as an island for a very short time when in the narrowest part of the Golden Gate. It has an irregular and bold shore-line of about 5 miles, and an area of one square mile. It rises to a height of 771 feet, is covered with grass and bushes, and cut in every direction by deep gulleys. As seen from the south-eastward it appears part of the northern peninsula, but is divided from that on its N.W. face by *Raccoon Straits*, three-quarters of a mile in width, having a depth of water ranging from 10 to 30 fathoms, and a very strong current. A narrow, high jutting point makes out from the S.E. portion of the island, bearing N. $\frac{3}{4}$ W. from Alcatraz Island light, and distant $1\frac{1}{4}$ mile. From this head the general trend of the southern face for over a mile is W. by S. toward Sauce-lito Point.

Punta de los Cavallos is half a mile N.N.W. from Lime Point Bluff. The shore line between them falls slightly back, and a very small valley makes down from the hills behind.

Point Sancelito.—From Point Cavallos the general trend of the shore is N.W. by N. for $1\frac{1}{4}$ mile to Point Sancelito, with nearly a straight shore-line.

One mile from Point Cavallos is the anchorage of Sancelito, where men-of-war and whalers formerly anchored. It lies abreast of a few houses forming the town of Saucelito, whence much of the water used in San Francisco was formerly taken in steam water-boats. North of this anchorage is a large bay, with but a few feet of water. From Saucelito Point to the western point of Angel Island, the distance is $1\frac{1}{2}$ mile, and the bearing N.E. by E. $\frac{1}{2}$ E. To Peninsula Point, forming the south-western part of Raccoon Strait, the distance is one mile, and bearing N.E. $\frac{1}{2}$ E.

TIDES.—As a general rule, there are upon the Pacific Coast of the United States one large and one small tide during each day, the heights of two successive high waters—occurring one, a.m., and the other, p.m. of the same twenty-four hours—and the intervals from the next preceding transit of the moon are very different, so much so that at certain periods a rock which has $3\frac{1}{2}$ feet upon it at low tide may be awash on the next succeeding low water.

These inequalities depend upon the moon's declination. They disappear near the time of the moon's declination being nothing, and are greatest about the time of its being greatest. The inequalities for low water are not the same as for high, though they disappear and have the greatest value at nearly the same times.

When the moon's declination is North, the higher of the two high tides of the twenty-four hours occurs at San Francisco about eleven and a half hours after the moon's transit; and when the declination is South, the lower of the two high tides occurs at about that interval. The lower of the two low waters of the day is the one which follows next the higher high water.

The corrected establishment, or mean interval between the moon's transit and the time of high water at San Francisco, is $12^h 6^m$. The mean rise and fall of tides is 3.6 feet; of spring tides, 4.3 feet; and of neap tides 2.8 feet. The mean duration of the flood is $6^h 39^m$; of the ebb, $5^h 51^m$; and of the stand, 34^m . The average difference between the corrected establishment of the a.m. and p.m. tides of the same day is $1^h 28^m$ for high water, and $0^h 38^m$ for low water. The differences when the moon's declination is greatest are $2^h 30^m$ and $0^h 45^m$. The average difference in height of these two tides is 1.1 foot for the high waters, and 2.2 feet for the low waters. When the moon's declination is greatest those differences are 1.5 foot and 3.7 feet respectively. The average difference of the higher high and lower low waters of the same day is 5.2 feet, and when the moon's declination is greatest, 6.1 feet. The higher high tide in the twenty-four hours occurs about $11^h 22^m$ after the moon's upper transit (southing), when the moon's declination is North, and about $1^h 2^m$ before, when South. The lower of the low waters, about 7^h after the higher high tide. The greatest observed difference between the two low waters of one day was 5.3 feet, and the greatest difference between the higher high and lower low waters of one day was 8.5 feet.

SAILING DIRECTIONS.

For approaching and entering San Francisco Bay.—In approaching the coast every opportunity should be seized for determining the vessel's position, as fogs and thick weather prevail near the land. Vessels coming from the southward make the coast about Point Año Nuevo (lat. $37^{\circ} 7' N.$), and follow it at a distance of 4 or 5 miles up to the bar. Steamers keep close under the land for fear of losing it in foggy weather. Coming from the westward, they first sight the South Farallon Island (lat. $37^{\circ} 42' N.$), having the light-house upon it, and keep upon either side of it; but it is preferable to go to the southward, especially in thick weather, and at night, as the vicinity of the island has not yet been surveyed in detail. From the South Farallon lighthouse the Point Boneta light bears N.E. by E. $23\frac{1}{2}$ miles. Coming from the north-westward they make Punta de los Reyes, 597 feet high, in lat. $38^{\circ} 0' N.$, long. $123^{\circ} 0' W.$, and pass within 2 or 3 miles of it, 15 fathoms being found within a quarter of a mile from it, but vessels are apt to lose the wind by getting too close under it. From the western extremity of this point, the Point Boneta light bears E. $\frac{1}{4}$ S., distant $25\frac{1}{2}$ miles, the line passing over the tail of Duxbury Reef, at a distance of $17\frac{1}{2}$ miles from Los Reyes.

The prolongation of the range from Aleatraz Island to Fort Point, giving a course N.E. $\frac{1}{4}$ E. for vessels entering the Golden Gate, is designated by Sir Edward Belcher "the fair-way line; and he calls the island and fort the "fairway marks." But with a heavy swell on the bar this range should be used merely as a line of reference, because on the bar it passes over a small 5-fathoms spot, while half a fathom more can be obtained for a distance of 2 miles, both North and South of it. In clear weather, and with a favourable wind, a vessel can cross the bar in not less than 5 fathoms from the line, having the North end of Aleatraz Island just open by Point Boneta (N.E. by E. $\frac{1}{4}$ E.) round to the shore South of Point Lobos (N.W. by W. $\frac{1}{4}$ W.). Northward of the former line the 4-fathoms bank (having $3\frac{1}{2}$ fathoms upon it), commences one mile West of Boneta, and stretches out over 3 miles, with a breadth of one mile. Upon this bank the clipper *Golden Fleece* struck in 1857, and came into port with 7 or 8 feet of water in her hold. She was the second of that name that was unfortunate in entering the harbour, the first having been totally lost on Fort Point.

Between the eastern extremity of the "4-fathoms bank" and the shore, the distance is seven-eighths of a mile, and within this space can be found the deepest water for entering the harbour, but it would be dangerous for a sailing vessel to attempt it with a flood tide and light winds. While it is break-

ing on the bank, only a heavy swell is found through this 8½-fathoms channel, and small sail boats have passed in safety when they dared not try the bar. We entered it in the brig *Wyandot*, in June, 1854, and the steam ship *Columbia* frequently used it in leaving the harbour for the upper coast, when the heavy weather on the bar would otherwise have delayed her in port. Close in under the cliffs, 2 or 3 miles above Boneta, we anchored in 8 fathoms muddy bottom.

During clear, moderate weather, any vessel can cross the bar, within the limits we have mentioned, without running until she has got on the "fairway line," whereby she might lose her slant of wind. Should the wind fail, or be light, and the current adverse, anchor outside the bar in 15 fathoms, mud and fine sand; or after crossing the bar in 6 to 10 fathoms, fine gray sand, with red specks in some places. Run in mid-channel between the heads, avoid too close proximity to the northern shore, not only in entering, but in leaving; the high, bold bluffs causing calms and baffling airs, even with a south-easter blowing out. On the last of January, 1864, during a south-easter, three vessels were at one time becalmed under the northern shore, and baffled with variable airs and strong current eddies for several hours.

Between Fort Point and the opposite shore, take special care not to approach Fort Point too close, because the currents set round it irregularly and with great rapidity, and the bottom is uneven and rocky. A depth of 69 fathoms is given in the centre of the channel. In the *Golden Gate* we have measured an ebb current running about 6 miles per hour. As a general rule the winds increase within the heads, drawing in very strongly abreast of Fort Point. When off this point steer for Alcatraz lighthouse until the North point of Telegraph Hill bears E. by S. Then steer to give it a berth of a quarter of a mile, running through among the shipping.

In making the port at night, it is customary to cross the bar with Fort Point light on with Alcatraz Island light; or better, the latter a little open to the northward. But this practice frequently involves much delay and annoyance, when the wind will not permit a vessel to attain this position without a tack. With Boneta light bearing from N. by W. to N.E. by E., a vessel may boldly run on within those limits, and unless there be a heavy swell safely cross the 4-fathoms bank. Give Boneta a berth of a mile, and when within the heads and Boneta abeam, gradually open Alcatraz light North of Fort Point, until abeam of the latter; then run for Alcatraz, until the lights of the shipping show the vessel's position. Hauling up for them, anchor off the North beach in 10 fathoms, or off the N.E. front of the city in 10 fathoms, soft mud.

In coming upon the coast in thick foggy weather, sailing vessels should not run into less than 50 fathoms, because the water around the South Farallon, and off Point San Pedro and Punta de los Reyes, is very bold. It is believed, however, that a 30-fathoms bank exists at a considerable distance to the

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westward of the last. S.W. of the line passing through the Farallones and Noon-day Rock, the 100-fathoms curve is only 4 miles distant, and the 50-fathoms curve only 2 miles, with a very irregular bottom. If the Farallones be made, a course can be easily laid for the bar, but it would be unadvisable to run into less than 10 fathoms, soft mud, if the bell-boat be not heard, as the set and strength of the currents off the bay are yet undetermined. Sir Edward Belcher says, that being caught in a fog, he anchored in 15 fathoms to the southward of the bar, and determined "that southerly of the fair-way line the ebb tide set N.N.E., flood S.S.W." We suppose he means from the N.N.E. and the S.S.W. During the season of freshets in the Sacramento and tributaries, the discoloured water outside the bar will frequently point out the position of the entrance.

Steamers in thick weather were accustomed to run close along the coast, and endeavoured to make the land North of Point San Pedro, running in until they got about 15 fathoms, and then laying a course for the bar, shoaling upon it to about 5 fathoms, and then gradually deepening, while the fog-gun gave the direction of Boneta light. Before the establishment of the fog-gun, the steam-ship *Tennessee* was wrecked 2 miles North of Boneta, when seeking for the entrance in a dense fog; the steam-ship *S. S. Lewis*, just North of Duxbury Reef; and the U.S. revenue brig *Lawrence*, between Points Lobos and San Pedro. Steamers and clippers are afraid to approach the bar in thick weather. We have entered in a dense fog without hearing the bell, and the general opinion is that it is ineffective.

In beating out, vessels start on the last quarter of the flood, make the first tack to the northward of the Blossom Rock, and weather it on the second; thence they keep between Alcatraz and the South shore, avoiding Bird Rock, one mile West of the South end of the island, and giving a good berth to Fort Point, past which the ebb current will carry them rapidly (with a strong tendency towards the South shore), and a couple more tacks carry them clear of the heads. If the vessel be bound to the northward, and the weather shut in thick, with the wind to the N.W., she makes a tack off shore to the southward of the Farallones; if the weather be clear, short tacks are made off shore until she works off to Los Reyes, because the sea to the leeward of that headland is much smoother, and the current less; then stands off until a course can be made for her port.

The Winds.—It has been advised to work close along shore to northern ports during the summer N.W. winds, and take the chances of land breezes to make latitude, but the attempt will double the length of any voyage. Baffling light airs and calms frequently exist along the coast, while vessels several hundred miles off have strong N.W. winds. Moreover, along the coast we know that the current frequently sets 2 miles per hour from the northward, except very close under the shores. In our experience we never yet have met a wind off the land North of San Francisco, and very rarely

North Pacific.

indeed South of it, except in the region of the Santa Barbara channel. As a general rule it may be safely stated that the summer winds follow the line of the coast nearly, and gradually draw towards and over the land. In winter, with winds from the southward, this is not so marked.

From April to October, inclusive, the prevailing wind is from the N.W., changing to West in valleys opening upon the coast, but in no case so strongly as through the Golden Gate. During the summer the wind sets in strong about 10 a.m., increasing until nearly sunset, when it begins to die away. During its height it almost regularly brings in a dense fog, which working its way over the peninsula, meets that already advanced through the Golden Gate, and envelopes San Francisco and the bay by sunset. As a rule the breeze does not dispel the fog. If a fog exist outside, the wind is sure to bring it in, but the heated earth dissipates it for a time.

From November to March the wind is frequently from the S.E., blowing heavily, working round to the S.W., with a large and broken swell from the S.W., weather thick, rainy, and squally; the wind not unfrequently ending at N.W., with an ugly cross sea. During heavy south-easters, the sea breaks upon the San Francisco bar, clean across the entrance, presenting a fearful sight. The sound can be heard at the anchorage in front of the city. During some winters a hard "norther" will spring up and blow steadily and strongly from one to five days, with a clear blue sky, and cold bracing weather. Winds rarely blow from points between North, round by the East, to S.E.

The further North we advance the heavier blow the gales in the winter. The N.W. winds are not predicted by the barometer, but from the S.E. almost invariably, the mercury falling one inch from its usual height of about 30 inches. When it begins to rise the wind may be looked upon as soon to shift round by the West, and to decrease. Only in one instance during our experience has this failed, and that was off the Strait of Juan de Fuca. On the tops of the mountains bordering the coast, light, variable, and easterly airs are frequently experienced, while the N.W. winds are blowing freshly along the sea-board. Upon Sulphur Peak, in lat. $38^{\circ} 46'$, and 26 miles from the coast, we have had fresh breezes from the E.N.E., whilst the usual North winds were prevailing off shore. On Ross Mountain, only 3 miles from the sea, and rising 2,197 feet from the right bank of the Slavianska River, we found variable airs, when strong summer winds were blowing below.

DUXBURY POINT and Reef.—From Point Boneta to Duxbury Point, forming the West side of Ballenas Bay, the course is W. by N. $\frac{1}{4}$ N., and the distance $9\frac{1}{4}$ miles. The point, sometimes called *Ballenas*, is a table land about 100 feet high, which stretches along the coast for a mile or more, and gradually rises to a narrow, nearly treeless ridge, 1,389 feet high at its

greatest elevation, and running in a straight line $25\frac{1}{2}$ miles N.W. $\frac{1}{4}$ W. to Tomales Point. The old Californians expressively call it the Cuchilla Grande. Parallel to this ridge on the East, and starting from the West end of the great cross ridge of Table Mountain, runs another to the north-westward, and the depression between them, abreast of Duxbury Point, forms the Ballenas Bay, as it does the Tomales Bay farther up the coast. This depression forms a long narrow valley, well watered and timbered, and in many places cultivated. Two streams running into each bay have their sources nearer the bay from which each runs. Duxbury Reef makes out $1\frac{1}{2}$ mile S.E. $\frac{1}{4}$ S. from the southern extremity of the point, and stretching towards Point Boneta forms a safe anchorage in northerly weather. From the tail of the reef to the rocky point E.N.E. from it, the distance is 3 miles, and from this line to the greatest bend of the bay the distance is $1\frac{1}{2}$ mile.

BALLENAS BAY.—In this bay the 3-fathoms line makes off three-quarters of a mile from the S.E. face of Duxbury Point, but approaching the low sand beach East of the narrow entrance to the lagoon. From 4 to 8 fathoms of water, with a regular bottom of sand and mud, are found in the bay, and 6 fathoms quite close to the reef. From Duxbury Point to the bluff, at the entrance to the lagoon, the distance is $1\frac{1}{2}$ mile N.E. by N.

The lagoon North of the bay is at the foot of the mountains, and except small crooked channels, is bare at low tides, and filled with small islets. The South side of this lagoon is bounded by a long, narrow, sand spit, stretching so nearly across it as to leave an entrance of but 100 yards wide at the S.W. part. Only a few small vessels run between this place and San Francisco.

The shore North of Boneta Point is bold and high, presenting a marked and peculiar undulating surface at right angles to the sea front.

North of Duxbury the hard rocky shore continues bold and high, but gradually merges into cliffs, consisting chiefly of yellowish clay and sand resting upon granite; and as the surface is regularly undulating, with the direction of the alternate ridges and valleys at right angles to the shore, the wearing action of the surf forms a continuous series of round-topped, bright, vertical bluffs, averaging 100 feet high, and presenting a very noticeable feature from the sea. Its resemblance to portions of the coast of England was one of the reasons which induced Drake to apply the name New Albion to the country in June, 1579.

The mountains in the back ground rise over 2,000 feet, and the "Table Mountain," of Beechey, attains an elevation of 2,604 feet, stretches nearly 2 miles inland at right angles to the coast, and forms a prominent mark from seaward, and from the Bay of San Francisco. A few large trees are seen along the top of the main ridge, running parallel with the coast and behind the valley, connecting Ballenas and Tomales Bays.

SIR FRANCIS DRAKE'S BAY.—From the tail of Duxbury Reef to the West end of Los Reyes, the course is W. $\frac{3}{4}$ N., and distance $17\frac{1}{2}$ miles. To the East end the course is W. by N., distance $14\frac{1}{2}$ miles. From Duxbury the shore is bold and compact, running nearly N.W. by W. for about 10 miles, then curving regularly to the westward, changing to a low shore, until it reaches its greatest latitude at the Estero de Limantour, which bears N. by E. $\frac{1}{2}$ E. from the East end of Los Reyes, distant 3 miles, thence the line curves to the southward and S.W., one mile West of the point, leaving a long, high, narrow point stretching to the East, and off which the breakers extend half a mile. This curving shore line forms Sir Francis Drake's bay, which affords a large and admirable anchorage in north-west weather: and by anchoring close in under the North side of the point in 4 or 5 fathoms, hard bottom, good but contracted anchorage is obtained in S.E. gales, as the swell rolling in from the S.W. is broken by the reef.

Several esteros or lagoons open into the North side of the bay, but their entrances are very narrow and shoal. The largest is the Estero de Limantour, which stretches to the northward over 3 miles, and one of its numerous arms approaches within a mile of the ocean beach, 5 miles North of Point Reyes Head. The entrance to this lagoon has 8 feet water, and is generally marked by breakers on either hand. Coasters can enter with the prevailing N.W. wind. It was named after Limantour, notorious for his attempted great land claim fraud in California. He was a Frenchman, but a citizen of Mexico, and asserted that in trading upon this coast in 1841, he lost the Mexican vessel *Ayachuco* at the entrance to this estero.

POINT REYES.—This is the most prominent and remarkable headland North of Point Concepcion. It is distinctly visible from the entrance to San Francisco Bay, and the summit of the ridge presents an irregular jagged outline, with the highest part about one-fourth of its length from the western extremity. Its southern face is a precipitous wall of hard sienitic granite, rising boldly from the ocean, attaining an elevation of 597 feet in 300 yards, and stretching away nearly in a straight line E. by N. and W. by S. for 3 miles. This direction is peculiar on the coast, and would not be expected from a consideration of the trend of the coast mountains, and of the Farallones, which are in line N.W. and S.E. On the North side the cape falls away regularly to a low undulating neck of land, cut up by esteros making in from Drake's Bay. When made from the southward it is raised as a long, high island; but on approaching it from the westward it is projected upon the mountains running North from Table Mountain, and its characteristics are not so readily recognised. Its base is very broken and rocky, and bordered by crags and hundreds of rocks, but they may be boldly approached, and 8 fathoms, hard bottom, obtained within less than a quarter of a mile. Off the eastern extremity a reef makes out half a mile in continuation of the point. Upon this reef it breaks heavily in bad

southerly weather, but 9 fathoms can be had close to the breakers. Off the western head a depth of 12 fathoms is found quite near to the rocks.*

Vessels bound to San Francisco from the northward always make Los Reyes, and, when up to it, sight two mountains on the southern peninsula of San Francisco as islands. One of these is *Blue Mountain*, 1,100 feet high, the other *Abbey Hill*, 1,250 feet.

The Lighthouse of Punta de los Reyes will be placed about a quarter of a mile from the western point. The ocean face is precipitous, and the light will be at an elevation of about 500 feet above the water.

THE FARALLONES.

SOUTH FARALLON.—The southern and principal one of the six rocky islets known as the *Farallones de los Frailes*, lies off the Golden Gate at a distance of 23½ miles; the whole group is disposed in a nearly straight line, running N.W. from the southern one. This is the largest and highest, extending nearly a mile East and West, attaining an elevation of about 340 feet above the sea, and presenting to the eye a mass of broken jagged rocks, upon which no vegetation exists, except a few stunted weeds. The rocks are sharp angular masses, which, becoming detached by the operation of natural causes, roll down upon the more level parts of the island, and cover it with irregular boulders. Notwithstanding that it is the outcrop of an immense dyke of granite, the condition of the superficial portion is such that it could be separated into small fragments by a pick or crowbar. A more desolate and barren place can hardly be imagined. From the hills about the Golden Gate the South Farallon is plainly visible, rising in regular pyramidal form.

Vessels from the westward, running for the Golden Gate, should keep to the southward of the South Farallon, especially in thick weather and at night. To the westward of it a depth of 50 fathoms is obtained at a distance of 3 miles, shoaling to 20 fathoms in 2 miles; whereas inside of it the bottom is very regular at 30 fathoms for 10 miles, and then decreases regularly to the bar. On the S.E. side of the island there is said to be good holding-ground in 15 fathoms. The San Francisco pilot boats cruise off the island.

South Farallon Light.—The tower stands on the highest peak of the principal island. It is built of brick, 17 feet in height, and is surmounted by a lantern and illuminating apparatus of the first order of Fresnel. It is a revolving white light, showing a prolonged flash of 10 seconds every minute throughout the horizon. It is elevated about 360 feet above the mean level of the sea.

* The headland of Punta de los Reyes was discovered by Cabrillo in 1542, but the present name was given by Viscaïno, in 1603.

Fog whistle on the South Farallon.—In January, 1859, a fog whistle, of 6 inches in diameter, was placed on the South side of the eastern part of the island, about 275 feet from the water. It is erected over a natural hole, in the roof of a subterranean passage connected with and open to the ocean, and is blown by the rush of air through the passage, caused by the sea breaking into its mouth. The sound should be heard in its vicinity at all times (its loudness depending upon the height of the tide and the waves), except about an hour and a half before and after low water, when the sea does not enter the mouth of the passage. It is said to have been heard at the distance of 7 or 8 miles.

The **MIDDLE FARALLON** is a single rock between 50 and 60 yards in diameter, and rising 20 or 30 feet above the water. It lies N. 56° W., distant 2½ miles from the lighthouse on the South Farallon. Its geographical position is lat. 37° 43' 31.6" N., long. 123° 0' 54.9" W.

The **NORTH FARALLONES** lie nearly in a line with each other and the Middle and South Farallones, and consist of a group of four islets, having a pyramidal appearance as their name denotes, and comprised within a space of little more than half a mile square. The northern three are quite high and bold, the highest peak of the middle one attaining an elevation of 166 feet, whilst the southern one of the group is a mere rock of about 35 yards in diameter, and hardly 20 feet above water. Viewed from the S.W. or N.E. breakers extend across from the largest island to the next one S.E., and during a heavy ground swell we have watched it from Point Reyes Hill, breaking on an isolated sunken rock, lying apparently between the northern and largest islet. From certain directions a small pyramidal detached peak shows close to the North side of the northern islet.

The northern islet, therefore, bears N. 64° W., distant 6½ miles from the lighthouse on the South Farallon. From the lighthouse site of Punta de los Reyes it bears South, distant 14 miles.

To the southward and eastward from the North Farallones, at a distance of 2 miles, we are informed that a sunken rock exists, having 4 fathoms water upon it, with kelp around it, except when torn away by storms. In good weather the fishermen fish around it; but in bad weather the sea breaks upon it. The *Noon-day Rock*, with 4½ fathoms of water upon it, lies W. by N., distant 3 miles from the North Farallones, with intervening rocky bottom in 35 fathoms. Between them and Los Reyes the depth increases to 50 fathoms about midway.*

* The Farallones de los Frailes were discovered by Ferrello, in February, 1543, and he is stated to have seen six islands in this vicinity, one large, and five very small, which Cabrillo had passed on the previous voyage. He states that for five days it was impossible to effect a landing upon them, on account of the S.W. winds and heavy sea.

Sir Francis Drake is the first that specially mentions them, in 1579, as lying off the harbour or bay, where he refitted his ships.

Noon-Day Rock.—This danger lies nearly on the prolongation of the line from the South Farallon, through the North Farallones. It is of very limited extent, and is doubtless a sharp, isolated point of a small ledge, having from 20 to 30 fathoms immediately around it. It is plainly visible when directly over it, and has $3\frac{1}{2}$ fathoms of water upon it at mean low water; but at the extreme low water of spring tides there will be hardly more than 4 fathoms. In very heavy weather and low water the sea breaks upon it, but this indication seldom exists, and must not be depended upon for ascertaining its position.

Boneta light will not be visible from a ship's deck, but may be seen from aloft under very favourable atmospheric circumstances.

In the description of the South Farallon, and in the directions for approaching San Francisco, we have heretofore advised vessels approaching the Golden Gate at night and in thick weather to keep to the southward of the South Farallon light. This advice has now more significance, and should be followed. With Punta de los Reyes and the Farallones in sight, vessels bound in and running between them should keep the western head of Los Reyes open on a N.N.E. course, coming, nothing to the eastward, until the North and South Farallones are in range, then bear away for the Golden Gate. In that position the rock will bear S.E., distant $2\frac{1}{2}$ miles. Coming from the north-westward at night, vessels should not bring the South Farallon light to bear anything East of S.E. by E., which will clear the rock by 2 miles, and the North Farallones by one mile.

South-west of the line passing through the Farallones and Noon-day Rock, the 100-fathom curve is only 4 miles distant, and the 50-fathom curve only 2 miles, with very irregular bottom.*

POINT TOMALES and Tomales Bay.—Northward of Punta de los Reyes we find a long reach of broad white sand beach, backed by sand dunes, and extending in a N. $\frac{1}{2}$ E. direction about 12 miles, curving to the N.W., and changing to a high precipitous coast, running to Point Tomales, which bears N. by W. 15 miles from Los Reyes. Three-quarters of a mile before reaching the point a rocky islet 80 feet in height is seen close inshore. Eight miles above Point Reyes is the opening to an estero, the North point of which is low and sandy. The wider arm runs 1 mile towards the head of the western branch of the Estero de Limantour, and little more than that

* *New Shoal off San Francisco entrance.*—It was reported, January, 1863, that a shoal had been discovered about 80 miles S.W. from the S.E. Farallon. It is said to have but from 5 to 7 fathoms of water on it, and lies directly in the track of vessels bound into San Francisco.

Shoal off the California Coast.—In latitude $37^{\circ} 25' N.$, and long. $137^{\circ} 30' W.$, rocks are reported having but from 3 to 5 fathoms water upon them. This information was obtained in 1855, and failing to ascertain anything more concerning it, it is now published to call attention and invite further examination.

distance from it. The other arm runs nearly $1\frac{1}{2}$ mile to the north-westward. The ridge forming Tomales Point and the western shore of Tomales Bay is the northern extremity of that starting from Duxbury Point. About $4\frac{1}{2}$ miles from the point the ridge is 673 feet high, with slightly lower ground a few miles South. It is where the sand dunes strike this ridge that the coast changes its character; thence to the point it is bold and rocky, with breakers about one-third of a mile off the point, and on the prolongation of the ridge, which averages less than three-quarters of a mile in breadth for the last 4 miles.

THE BAY OF TOMALES extends from Tomales Point S.E. $\frac{1}{2}$ E. for $12\frac{1}{2}$ miles, with an average width of seven-eighths of a mile. The entrance is narrow, and obstructed by a bar having a depth of 10 feet, between sandy humps of 7 feet. The bar lies nearly half a mile East of the extreme point, and 400 yards from the bluffs. It is exposed to the full force of the N.W. swell, and with the least swell from seaward it breaks across the whole entrance. For 2 or 3 miles this bay is contracted, but has a narrow deep channel close under the western shore. Four miles within the point lies a small island near the middle of the bay; beyond it the depth of water becomes more regular.

BODEGA HEAD.—This point lies N.N.W. 18 miles from Los Reyes, and forms the northern point of Bodega Bay, considering Tomales Point the southern. The head is 200 or 300 feet high, with a slightly rounding summit, and continues of nearly the same height for a mile or two northward, where it changes to a broad sand beach, with low country near, but high hills in the back ground. The face of the land about here begins to change from its uniform want of trees, to hills partially covered. It has been frequently held out as a warning not to mistake Bodega Head for Punta de los Reyes, but there exists no reasonable ground for raising a question on this subject, although navigators who have lost or jeopardised vessels offer as an excuse the great similarity of the coast and headlands to those near the Golden Gate. We have never been able to detect it. The highest part of the head is about 265 feet above the ocean. From an examination of this section, it is believed that it is the continuation of the Tomales ridge.

BODEGA BAY.—From Tomales Point to Bodega Head the course is N.W. $\frac{3}{4}$ W., and the distance $4\frac{1}{2}$ miles. The average width of the bay to the eastward of the above line is $1\frac{1}{2}$ mile, with the shore running nearly a parallel course. It is bordered by numerous rocks, is abrupt, and reaches a height of 594 feet less than a mile inland. The anchorage lies between the head and the mouth of the *Estero Americano* (called *Avatcha* by the Russians), which lies E. 16° N., $2\frac{1}{2}$ miles from the head. One mile West of the estero a low narrow sand-spit $1\frac{1}{2}$ mile long, and covered with bushes, stretches towards the head, within 100 yards of it, where a passage exists

for the waters of the extensive lagoon North of the sand spit, having small and intricate channels, but almost destitute of water at low tides. The anchorage is half a mile outside of this passage, and about N. $\frac{1}{2}$ E. of the rocky islet, in 5 or 6 fathoms, hard bottom of coarse sand and small patches of clay. It is protected by the head and the low rocky islet and reef, about three-quarters of a mile off the S.E. face, from the full force of the N.W. swell, which generally rolls in disagreeably in the open part of the bay, if the weather is heavy. The reef is densely covered with kelp, and the breakers usually indicate its position. Between the islet and the head there is a narrow $4\frac{1}{2}$ -fathom passage, opening directly upon the anchorage. In coming from the N.W. in summer this channel is available, but in beating out it is too contracted to be safe. During the winter season it is necessary to anchor well out, to be ready to slip and run, as the sea-room is very contracted and the swell heavy. Some vessels have ridden out heavy south-easters, but several have been lost. In beating out, the only danger is the reef off the head.

On account of the general depression of the coast hills behind Bodega Bay to about 500 or 600 feet elevation, and the valley in which the Estero Americano lies, being perpendicular to the coast line, the summer winds draw in towards the Petaluma valley with great force. The trunks of the oak trees rise straight for about 10 feet, then bend almost at right angles, without a branch for 10 or 15 feet, and terminate in a clump of branches all dragged out by the force of the wind. Fogs are found drawing in sooner and more frequently than upon any other part of the coast.

The country in the vicinity of the bay is very productive, both in the valleys and upon the hills. The produce is placed in lighters at the "Port" or embarcadero, about 1 mile within the lagoon, and carried by the current to the anchorage.

A fine tract of agricultural country stretches behind the coast hills, extending from Russian River valley to Petaluma creek, by which channel the produce of this region finds its way to San Francisco.

Fort Ross.—The rocky, contracted, and unsafe anchorage off this place is N.W. $\frac{3}{4}$ N. from Los Reyes, distant 32 miles, and 15 miles from Bodega Head. The large white buildings of the Russians on the rising ground, and about 100 feet above the sea, are the only marks for making it, and the shore is so steep and guarded by rocks and reefs as to render approach dangerous. No trade is now carried on here.* The shore between Bodega

* The property of the Russian establishment at Ross and Bodega had (August, 1841) just been transferred to Captain Suter, of New Helvetia, at San Francisco, for the consideration of 30,000 dollars. In the purchase was included all the stock, houses, arms,

Head and Fort Ross curves slightly to the eastward of the line joining the two places. Sand dunes commence $1\frac{1}{2}$ mile from the southern point of the head, and extend $2\frac{1}{2}$ miles to the mouth of a small stream called Salmon Creek; these dunes are bordered by a broad sand beach. Nine and a half miles from the head the Slavianska of the Russians empties into the sea, breaking through the coast hills that here reach an elevation of 2,200 feet. During the summer months a dry bar forms completely across the mouth of the river, so that the travel along the coast passes over it. It requires heavy rains to break through it, and forms again after a few weeks of dry weather. During the summer the bed is dry above *Healdsburg*, 30 miles from the mouth, and can be forded in several places in that distance. Before breaking through the coast hills it comes from the northward, through a broad fertile valley. The arroyos and streams opening into the Russian River near the coast are filled with a very dense growth of heavy redwood; and in 1860 a tram-road was being graded along the coast to the lagoon inside of Bodega Head, to carry the lumber from the mill on the river.

From Ross Mountain, 2,198 feet in height, we have frequently watched the discoloured water of the river working along close inshore to the northward, and never to the South. The fishermen experience the same eddy current. This stream is usually known as *Russian River*. De Mofras calls it the *San Sebastian*.

Northward of this river again commence the high coast hills, covered with timber, which gradually approaches the coast, and reaches it about halfway

utensils, and cattle belonging to the establishment. It was understood that this post was abandoned, by order of the Russian Government, the Russian Company no longer having any necessity to hold it to procure supplies, as they are now to be furnished under a contract with the Hudson Bay Company; and by giving it up they avoid many heavy expenses.

Bodega was first established by the Russians in 1812, under a permission of the then Governor of Monterey to erect a few small huts for salting their beef. A small number of men were left to superintend this business, which in a few years increased until the place became of such importance in the eyes of the Spanish authorities, that on the Russians attempting to establish themselves at San Francisco (on the Island of Yerba Buena), they were ordered to leave the country. This they refused to do, and, having become too strong to be removed by the Spanish force, they had been suffered to remain undisturbed until the time of our visit.

From what I understood from the officers who had been in charge of Bodega, it had been a very considerable expense to the Russian American Company to fortify it, and the disposal of the whole, on almost any terms, must have been advantageous. Captain Suter had commenced removing the stock, and transporting the guns, &c., to his establishment.

The buildings at the two posts numbered from fifty to sixty, and they frequently contained a population of four or five hundred souls. Since the breaking up of the establishment, the majority of the Russians returned to Sitka, the rest have remained in the employ of the present owner.—*Commodore Wilkes, U.S.N. Narrative, &c.*, vol. v. 179-80.

to Fort Ross. The Russian vessels used this as a distinctive mark for making that anchorage. Where the timber commences to skirt the coast a bold spur of the mountains comes directly upon the sea. At Fort Ross there is a small extent of open, cultivated ground, moderately low, but backed by the high wooded country. The coast and coast hills to the northward are mostly covered with dense forests of immense redwood, pine, and a thick undergrowth. At one of the coast survey mountain stations over forty trees were cut down that measured from $5\frac{1}{2}$ feet in diameter (spruce) to $8\frac{1}{2}$ feet (redwood).

Two miles above Fort Ross is a small contracted anchorage, called *Timber Cove*, where a great deal of lumber is sawed, and carried by coasters to San Francisco. Eight miles above Ross is another contracted anchorage under *Salt Point*, where coasters load lumber.

From Fort Ross to Punta de Arena the coast is almost straight, running N.W. by W. $\frac{1}{4}$ W. for 37 miles. It is compact and abrupt the whole distance, covered with trees to the water's edge, and backed by an unbroken ridge of hills about 2,000 feet high, and wooded to their summits.

Haven's Anchorage.—About 24 miles north-westward along the coast from Fort Ross is a contracted anchorage, under high precipitous rocky islets, with a short stretch of beach on the main, affording a boat landing. There is a protection, when anchored close in, against heavy N.W. weather; but it would be very difficult to recognize the locality unless the position of a vessel approaching it were accurately determined. Northward of this anchorage high, bold rocks line the coast for 4 or 5 miles. They are generally known as *Fishing Rocks*.

A few miles South of this anchorage is the mouth of the *Walalla River*, open in the rainy season, but having a dry bar in summer. It rises South of Fort Ross, behind the first range of coast hills. One of the coast survey stations on the North side of the river, and 3 or 4 miles from the coast, has an elevation of 2,192 feet, and this may be taken as the general height of this coast range.

POINT ARENA.—This is the first prominent headland North of Los Reyes, from which it bears N.W. $\frac{1}{4}$ W., distant 67 miles. Lat. $38^{\circ} 57' N.$, long. $123^{\circ} 45' W.$ Approached either from the northward or southward, it presents a long level plateau, stretching out about 2 miles West of the highlands, and terminating in a perpendicular bluff, that averages about 200 feet in height, except the extreme N.W. part, which is comparatively low, partially covered with sand, and destitute of trees for some distance inland. When seen from the southward, with the sun shining upon the face of the bluff, it shows remarkably white for the length of 2 miles. In fact, no point upon the coast presents such a bright appearance, or such uniform vertical bluffs, composed of hard rocks, twisted and distorted into many plications. Bold water is found close off the point, outside the kelp, which,

stretching strongly to the southward, shows the set and comparative strength of the current.

About 2 miles southward of the point, a small contracted valley opens upon the shore, and off it is an anchorage for small vessels, moderately well protected from the N.W. swell, but open to the S.W. Several schooners have gone ashore here. A large bed of kelp lies off the anchorage.

About a mile and a half N. by W. from the point are several rocks showing just above water, and upon which the least swell breaks. These were noticed by Vancouver in October, 1793. When 1 mile broad off Arena a high sharp pinnacle rock shows well out from the shore on the horizon to the southward, with some rocky islets inside, and breakers well out beyond the *Pinnacle Rock*, yet northward of it; but their distances from shore are probably not so much as a mile. Ten miles above Point Arena is a small stream called the *Nevarro*, upon which is a lumber mill. Articles floating from this river are found on the coast to the northward of it.

Albion River.—From Point Arena, the first point to the north-westward, is 24 miles distant, and bearing N.W. by N. $\frac{1}{2}$ N. After passing Arena the coast trends to the eastward of North, and for 6 miles presents a low shore line with sand beach, changing suddenly to a straight, high bluff shore, with a few trees, and backed within half a mile by hills of 2,000 ft., covered to their summits with wood. Sixteen and a half miles from Arena is the mouth of the Albion River, a very small stream, with the barest apology for a harbour at its mouth. A saw-mill upon this stream induces coasters to obtain freights here, but a great many of those trading have been lost. In 1853, the coast surveying steamer *Active* passed in, but broke her anchor on the rocky bottom.

MENDOCINO BAY.—Twenty and a half miles from Arena, and 4 above Albion River, is a contracted indentation called Mendocino Bay, available for a few vessels in summer, but dangerous in winter. The northern and southern points are about three-quarters of a mile apart, and the eastern shore retreats nearly half a mile. At the southern head are several small rocks, and one large islet surrounded by rocks, off which are heavy breakers. Midway between the heads is a small reef upon which the sea breaks heavily with very little swell. Deep water is found close around this reef. Off the northern head is very bold water close to it. Into the N.E. part of the bay enters the river Noyon, or Rio Grande, between 200 and 300 yards wide, with a good channel on the southern side, a broad flat sand on the northern, and a bar at the mouth with but a few feet of water, and upon which it always breaks. The eastern shore is bold and rocky. In the south-eastern part is a sand beach, with a reef extending from its centre.

The bay forms so slight an indentation in the coast line, that it is difficult to find without acquaintance with its minutest peculiarities, as there are no prominent marks by which to determine it. The North head is a table bluff

about 60 feet high, and destitute of trees to the northward and some distance in shore. The South bluff is likewise destitute of trees, but more irregular in outline than the other. Vessels bound for it in summer work a little to windward; then run boldly in towards the N. point, upon which the houses become recognized, keep as close as possible along the shore, gradually decreasing the distance to 100 yards just off the South end of the point in 6 fathoms, run on about 150 yards past the point, head up handsomely, and anchor in 5 or 6 fathoms hard bottom. It is a bad berth in summer, and in winter a vessel must anchor far enough out to be able to slip her cable and go to sea upon the first appearance of a south-easter. Several vessels have been driven ashore here.

An extensive saw-mill is located on the North side of the river some distance up; formerly (1853) it was on the North head, and a stationary engine was placed near the mouth of the river to draw loaded cars up the inclined plane, whence they were drawn to the mill. The lumber was slid down chutes into large scows and carried to the anchorage. The place is now sometimes called *Meigsville*; formerly it was *Mendocino City*.

From the point just North of Mendocino Bay (the first one made from Arena), the shore runs nearly straight for 28 miles N. by W. $\frac{1}{4}$ W., being low and bounded by rocks for 12 miles, when the black hills reach the water, and present an almost vertical front 2,000 feet in height.

From the deepest part of the bight the general trend of the coast to Cape Mendocino is N.W. $\frac{3}{4}$ W., and distant 45 miles, and for the whole of this distance it is particularly bold and forbidding, the range of hills running parallel to the shore and rising directly from it. It has been found impossible to travel along this stretch of seaboard; and the trail turns well into the interior valleys.

Shelter Cove.—From the compact shore above described a plateau, destitute of wood, and being from 80 to 300 feet in height, makes square out just above latitude 40° N. for a distance of half a mile, affording an anchorage from N.W. winds, and may perhaps be regarded as a harbour of refuge for small coasters which have experienced heavy weather off Cape Mendocino, and are short of wood and water, both of which may be obtained here from one or two gulches opening on the sea.

From Point Arena it bears N.W. by N. $\frac{1}{4}$ N., distant 65 miles. The whole sea-face of the bluff is bounded by thousands of rocks above and below water, and vessels coming from the North for shelter must give it a wide berth, rounding it within one-third of a mile, and anchoring in 5 fathoms, hard bottom, about one-third of a mile from shore. In this position fresh water comes down a ravine bearing about North, and an Indian village existed in 1853 at the bottom of the wooded ravine, a little further to the eastward. There is always a swell here, and boat landing may not be very easy.

PUNTA GORDA is 17 miles N.W. by W. $\frac{1}{2}$ W. from Shelter Cove, and as its name implies, is a large bold rounding point. Half a mile off it lies a large rocky islet, with rocks close inshore, North of the point. From Punta de Arena it bears N.W. $\frac{3}{4}$ N., distant 81 miles, and the line passing tangent to Punta Gorda runs 1 mile outside of Cape Mendocino. La Perouse calls Cape Fortunas Punta Gorda.

CAPE MENDOCINO is 93 miles N.W. $\frac{3}{4}$ N. from Punta de Arena. Here the range of coast hills from the southward appears to meet a range coming from the eastward, forming a mountainous headland of about 3,000 feet high, which is the western limit of the N.W. trend of this section of the coast. The cape is in lat. $40^{\circ} 25' N.$, long. $124^{\circ} 22' W.$

Blunt's Rocks.—About 3 miles broad, off the cape, lies a reef, just under water, known as Blunt's Rocks or Reef, upon which the sea generally breaks. This reef was noticed by Vancouver as being about 1 league off shore. Halfway between it and the cape, and a little to the southward, is a sunken rock, which has been discovered within the last two or three years, but not yet accurately located. It is called *Fauntleroy's Rock*. Steamers have passed dangerously near it, and in 1857 it was distinctly seen almost under the wheel of the steamship *Commodore*. Vessels can perhaps pass over it in smooth weather, but with a heavy sea the water must break.

To the southward, and immediately off the pitch of the cape, lie numerous rocks and rocky islets, the latter being large and high, with a peculiar pyramidal or sugar-loaf appearance. None of them seem to be more than half a mile from the shore, which is almost perpendicular, and destitute of a beach.

The face of the cape is very steep, rocky, and worn. Above this the general appearance is rolling, and the surface covered with timber. The pyramidal islets off it are very readily distinguished in approaching from the North or South.

The **LIGHTHOUSE** on the W. extreme of Cape Mendocino, completed in 1868, is an iron polygonal tower painted white, and 20 feet high, surmounted by a red dome to the lantern. It shows a lens light of the first order, *revolving* in every 25 seconds, showing a bright flash of 5 seconds duration. It is elevated 380 feet above the sea, and may be seen 27 miles off.

Seven miles South of Mendocino a small stream, called the *Mattole*, empties. Upon the sides of the hills in Lower Mattole, and not above a mile from the Pacific, coal oil springs were discovered in 1861. Along the course of this stream are numerous bottom lands under cultivation.

CAPE FORTUNAS, or **False Mendocino**, lies northward of Cape Mendocino, distant 5 or 6 miles, and is another bold spur of mountainous headland, similar, and almost as high as that cape. Between the two the shore recedes slightly, is depressed, and forms a beach, receiving a small stream called *Bear* or *Mc Donald's Creek*, coming down through a narrow valley or gulch.

Off this cape lie several rocky islets, presenting the same peculiarities as those off Mendocino. There is no beach at the face of the almost perpendicular sea face.

The vicinity of these headlands certainly deserves a detailed hydrographic and topographical survey. It is reported that the soundings have been obtained well to the westward of the cape; should such prove correct, the fact will be of importance to vessels, especially steamers, bound North or South, when near the coast and enveloped in fog, as it would enable them to judge of their position, and change their course. After passing it the shore changes to a straight, low, sandy beach, with valleys running some distance inland. We have ventured to call this Cape Fortunas, to avoid the repetition of Mendocino, and to commemorate Ferrelo's (the pilot, and successor of Cabrillo) discoveries.

Eel River is a small stream, with a bar at its mouth, and distant 14 miles from Cape Mendocino. It is very contracted and crooked, receiving the waters of a great many sloughs near its mouth, and draining a most fertile valley, which is rapidly filling up with settlers.

HUMBOLDT BAY.—The entrance to this bay lies 21 miles from Sugar-loaf Islet, off Cape Mendocino; and the bar N. by E., $22\frac{1}{2}$ miles from Blunt's Rocks. The bar is $1\frac{1}{2}$ mile from the entrance between the sand points, or 2 miles from the S.W., and highest point of *Red Bluff*, which is the second bluff above Eel River. Like all the bar rivers on this coast, it undergoes irregular changes, depending much upon the prevalence, direction, and strength of the wind. Early in 1851 it bore N.W., distant 2 miles from Red Bluff, and about half a mile from the beach of the North Spit. Three and a half fathoms were found upon it, with a width of 250 yards between the 3-fathoms curves, retaining nearly the same width, and running on a S.W. course towards the bluff, but approaching closer to the North than to the South Spit. When between the two the depth of water was increased to 11 fathoms, suddenly shoaling to 4 fathoms inside. Vessels kept the North Spit within 150 to 250 yards on the port hand for 2 or 3 miles after entering. In the fall of 1852 the bar was reported to have moved to the northward its entire width, and the ranges for going in, as laid down by the survey of the previous year, were entirely useless.

In 1857 less than 13 feet at high tide could be found upon it, and its extent was very much increased. Eventually a deep and narrow channel will be cut through. About 1852 a steam-tug was placed upon the bay, and has rendered the most effective service in determining the changes of the bar. When vessels are seen approaching the bar, a flag is hoisted on Red Bluff, and a tug goes out to take them in. If it is breaking so heavily on the bar that she cannot get through it, and it is yet practicable for the vessel to run in, she takes up a position and hoists her flag as a signal for the vessel to

steer for her. She is invaluable in towing out the deeply laden lumber vessels, as the summer winds blow directly in the channel.

The **LIGHTHOUSE** is erected on the North Spit, three-quarters of a mile North of the entrance, and about midway between the bay and the sea shores. It consists of a keeper's dwelling, with a tower rising 21 feet above the roof, from the centre, both being whitewashed, and surmounted by an iron lantern painted red. The light is a fixed white light of the fourth order of the system of Fresnel, and illuminates the entire horizon. It is elevated 53 feet above high water spring tides, visible 12 miles off.

The bay is situated immediately behind the low sand spits and dunes, and extends 9 miles North, and 4 miles South of the entrance, being contracted to less than half a mile in width between the South Spit and Red Bluff; it then expands to nearly 3 miles, and runs a mile and a half to the eastward of Table Bluff. The single channel running into this part of the bay divides into two crooked ones, which contain from one to three fathoms of water; all the rest shows a bare mud flat at low tides. Abreast of the entrance it is nearly a mile in width, with extensive sands bare at low tides, lying midway between the opposite shores, and running nearly parallel with them. To the northward its average width is half a mile for a distance of $3\frac{1}{2}$ miles. It then expands into a large shallow sheet of water, having two or three crooked channels through it, but the greater part being bare at low tides, showing extensive mud flats, bordered by a grassy flat nearly a mile in width. In the channel way close to the North Spit, not less than 3 fathoms may be carried, increasing for three miles to $6\frac{1}{2}$ fathoms. One mile North of the entrance, and on the eastern side, enters a small stream, called *Elk River*. Two miles North of the entrance, and on the East side, is situated the town of *Bucksport*, off which a depth of $3\frac{1}{2}$ fathoms is found within 150 yards of the shore. Vessels are got alongside the Saw-mill Wharf here at high tide to load; at low tides they rest upon the muddy bottom.

The military station of *Fort Humboldt* is on a reservation on the bluff, about 100 feet high, and immediately behind the town. On the same side, and 4 miles North of the entrance, is the town of *Eureka*, off which is a portion of the channel, having nearly 3 fathoms in it, but no channel reaching it having more than $1\frac{1}{2}$ fathom. The town was laid out before this latter fact was discovered. Vessels lie at the wharves, resting on the mud at low tide. Abreast of Eureka lie several low marshy islands cut up by sloughs and ponds. The largest, called *Indian Island*, is about a mile long (N.E.) by half a mile in width. It is marked by two hillocks, surmounted by clumps of trees, near which were (1854) several wretched Indian huts. The smaller islands lie between this and the eastern shore, and parallel with it. *Arcata*, formerly Uniontown, is situated on the N.E. shore of the bay, and can only be reached by boats at high tide. It is the starting point for the Trinity and

Klamath mines. From it an extensive wharf stretches far out over the mud flat, which vessels can reach at high tides.

The southern spit from the entrance to Table Bluff does not average one-quarter of a mile in width, is formed of low sand dunes and grassy hillocks, and bordered on the bay side by marsh. At the southern extremity rises Table Bluff, which the name well describes, to a height of about 200 feet, its western point nearly reaching the sea beach, and forming a good landmark for making the bay. Five miles East of it the hills commence rising. Abreast of the North end of the South spit rises Red Bluff, presenting to the entrance a perpendicular face, composed of sand and gravel, coloured by the decomposition of iron ore near its surface, which is 96 feet above high water, and destitute of tree or bush. The bay front of the bluff is about one-third of a mile long, gradually declining to the low, flat land to the North, and also falling away to the South and East. On this bluff the pilots have a flag-staff to range with known points of trees beyond, by which they cross the bar, and keep the run of its changes. The low land on the eastern shore, above Red Bluff, averages half a mile in width, and runs as far as Eureka, gradually changing to marsh, and bounded by plateaus and hills covered with wood. The North Spit averages half a mile in width, and its southern extremity is composed of sand dunes and grassy hillocks, disposed in a marked manner with the direction of the N.W. winds. Two miles from the entrance trees cover the hillocks, and run northward one mile, when a space of a mile occurs without them. After that they continue along the shore.

Mad River is said to empty into the sea about a mile North of Humboldt Bay. It averages about 100 yards in width, with a bar at its entrance that prevents egress; but the vast amount of timber in the valley must eventually find a passage through a canal to the N.W. point of Humboldt Bay. A deep slough from the latter is said to approach quite close to Mad River, thus favouring the execution of such a project. This river is the Rio de los Tortolas of Heceta and Bodega, 1775.

TRINIDAD HEAD lies N. $\frac{1}{2}$ W., $17\frac{1}{2}$ miles from the bar of Humboldt Bay, and North 39 miles from Cape Mendocino. The low sand beach off Humboldt continues past Mad River to within a couple of miles of Trinidad Bay, when it changes to a bluff, guarded by innumerable rocks. For the entire distance of the low beach a depth of from 10 to 15 fathoms may be found one mile from the shore.

TRINIDAD BAY.—The bay or roadstead of Trinidad is very contracted, but having deep water, and all dangers visible, forms a moderately good summer anchorage. The "head" forming the western shore of the roadstead, and a prominent mark when seen from close in, is about 375 feet high, covered with a low, thick undergrowth of scrub bushes, has very steep sides, and 8 fathoms close to its southern base. Off the western face, for nearly half a mile out, lie several high rocky islets, with one half a mile South of it,

North Pacific.

but having 9 fathoms close to it. From the South face eastward to the 3-fathoms curve, the distance is one mile, and the depth of the bight to the northward of this line is about half a mile, with half a dozen rocks lying outside the 3-fathoms line, but well above water. In the northern part of the bay, there is a sand beach, extending about half a mile; thence eastward the shore is very rocky, the bluff being about 300 feet high, and covered with a heavy growth of timber. The town, formerly a place of some promise, fronts on the N.W. part of the roadstead, and the boat landing is on the North side of a round knoll, making out about 100 yards from the low neck running to the "head." A wharf is now built here, at which vessels lie to load lumber. A very considerable quantity of seaweed lies off the shore. The neck near the town is in lat. $41^{\circ} 3' 20''$ N., long. $124^{\circ} 8' 8''$ W.

In working into the anchorage, beat in boldly past the outermost rock, until the rock just off the eastern side of the head is in range with the knoll (having a few trees upon it), between the town and the head, with the South face of the head bearing W. by N., and anchor in 7 fathoms, hard bottom, within one-third of a mile of the rock and head, having the neck visible to the westward of the knoll, and a sugar-loaf rock beyond the neck showing over it. A swell will generally be found setting in. In winter it is a dangerous anchorage, and if a vessel is unluckily caught, her chances of riding out a south-easter are very few. The town during the winter is nearly deserted, but a brisk trade is carried on in summer. The connection with San Francisco by steamers is yet uncertain. The land in this vicinity is very rich, and well adapted to agriculture. The redwood trees grow around it, and attain an enormous size. The stump of one which we measured was about 20 feet in diameter, and a dozen trees standing in the vicinity averaged over 10 feet. One is affirmed to be standing on the bank of a small stream at the S.E. part of the bay that measures over 90 feet in circumference. The bark of these trees has a thickness of from 8 to 14 inches; they grow perfectly straight, retaining their thickness to a great height, begin to branch at 50 or 100 feet, and frequently attain 250 feet in height. The forests of this timber, when free from undergrowth, present an imposing sight.*

The shore running N.W. by N. from Trinidad Head for 5 miles is remarkably broken and rocky, which induced Vancouver to call its northern extremity Rocky Point. He placed it in $41^{\circ} 8'$. About 1 mile off it lie several rocks that are sometimes known as the *Turtles*.

From Rocky Point the shore takes a gentle sweep eastward, making its greatest indentation at the North end of the once famous *Gold Bluff*, in lat.

* Port Trinidad was discovered June 10th, 1775, by Heeta and Bodega, and placed in lat. $41^{\circ} 7'$ N. Near it they place a stream, which they call the Rio de los Tortolos, or Pigeon River; this is now called Mad River.

41° 27' N., and long. 124° 3' W., and then trending westward to Crescent City. Gold Bluff has an extent of 10 miles, and is very bold and high.

Between Rocky Point and Gihon's Bluff, which is the first one to the northward, there is a stretch of low sand beach, immediately behind which is an extensive lagoon several miles in length, and from a quarter to one mile in width. It lies parallel with the beach, and at some seasons is not connected with the ocean, but at others an opening exists at the northern extremity. The Indian name of this lagoon is *Æ-shæ-sho-ran*.

Redding's Rock lies 5 miles broad off Gold Bluff, in lat. 41° 21', and long. 124° 10'. It is a single, large, rocky islet, about 200 feet high, and reported to have deep water all around it, with no outlying dangers, but its vicinity has not been surveyed. Vancouver places it in lat. 41° 25' on his chart, and 4 miles off shore; but in the narrative states the distance at half a league, and that it is half a mile in circuit. His track lies inside of it. We have been informed that a reef, commencing at the shore 2 miles above the rock, stretches out towards it. The rock received its present name in 1849 or 1850.

KLAMATH RIVER.—The mouth of this river is in lat. 41° 33' N., long. 124° 5' W. It is perhaps 200 yards wide, having a long sand spit on the South side, running N.W. and parallel to the high hills that form the North shore. South of the entrance for a mile and a half are outlying rocks, and at the North side of the entrance lie several others. It is reported to have 2½ fathoms upon the bar. Upon passing it in 1853, within less than a mile, the sea was breaking across it, and no appearance of a safe channel was presented. Small schooners enter it; but we have been assured that the mouth was completely closed in the winters of 1851 and 1860, and that the bar changes with every change of heavy weather.

Three or four miles northward of the Klamath is a small sharp indentation at the mouth of a gulch, off which lie one large and several small rocks; but from a distance of a mile and a half, we were unable to determine whether any stream opened here. It has, however, received the name of *False Klamath*, because it has misled small coasters seeking for the Klamath, although there is no sand point on either side, as exists at the latter. The State map of California has a creek, called Ahmen, opening here. The coast continues bold for several miles, when the hills begin to recede, and the shores present many pleasant slopes, unincumbered with forests, and now under cultivation. The shore is low, and regularly sweeps to the westward for a couple of miles, forming the roadstead which will next be described.

CRESCENT CITY BAY.—This the most dangerous of the roadsteads, usually resorted to on the coast, has acquired much importance, on account of the town (Crescent City) being the depot for the supplies of miners working the gold diggings on the Klamath, Trinity, and Salmon Rivers. It is

filled with sunken rocks and reefs, and has a goodly number showing above water. No vessel should think of gaining an anchorage here without a pilot, or perfect knowledge of the hidden dangers. No sunken rocks are now known to exist outside of the line of visible ones, except one awash, S.W. $\frac{3}{4}$ W., and a little more than half a mile distant from the lighthouse. A depth of 10 fathoms exists all around it, and 7 or 8 fathoms outside of the visible rocks. The usual anchorage is on a line between the lighthouse and the North side of the large islet, three-quarters of a mile East of it, in $3\frac{1}{4}$ fathoms, hard bottom. To reach this position, run for the small round rock, bearing S. 55° E. seven-eighths of a mile from the lighthouse; pass it on the East side, giving it a berth of 100 yards; steer N. by W. $\frac{1}{4}$ W. for three-eighths of a mile, passing 100 yards East of Fauntleroy Rock, which is covered at three-quarters flood. If this rock be covered, its position is generally marked by a breaker. It is necessary to keep it close aboard, because there is a sharp bayonet rock, having only two feet of water on it, and 200 yards to the eastward. Head up for the town, and anchor in $3\frac{1}{2}$ fathoms. To enter or leave it at night, as is done by the mail and coasting steamers, requires a perfect local knowledge of the dangers and peculiarities of the land-marks. Coasting steamers in fine weather usually anchor close in shore to discharge freight, which is received in lighters.

A wharf has been built out from Battery Point, and landing is now easily effected in good weather. In south-easters, the breakers wash over it.

In summer there is always some swell here, but in winter it rolls fearfully and vessels must choose a position to be ready to run to sea at the approach of a south-easter.

Communication is maintained with San Francisco and other ports by mail and coasting steamers, which generally carry as many passengers and as much freight for this place, as they carry to the Columbia River.

The town lies N.W. from the anchorage, immediately on the low shore; old drift logs, in some instances, forming the foundation for wooden houses. In August, 1853, there were about 135 houses of all descriptions. In 1860 the population was 553, and the number of houses 176.

The lands adjacent are being cultivated; a grist mill has been built, and a good trail leads to the "diggings" on the Klamath and Illinois Rivers.

The S.W. point of the bay is elevated about 25 feet, and continues so to the westward. The lighthouse is erected on the rocky islet about 300 yards from the point, and connected with it at low tides by a broken mass of rocks, over which a single foot-bridge is constructed.

The **LIGHTHOUSE** consists of a keeper's dwelling, of stone, the natural colour (grey), with a low tower of brick, plastered and whitewashed, rising

from the centre, and surmounted by an iron lantern painted red. It is situated at the S.W. part of the roadstead, on the seaward extremity of the island point, which is here about 45 feet above high water.

The light is a fixed white light, varied by *flashes*, of the fourth order of Fresnel. The interval of flash is 1^m 30". It illuminates 315° of the horizon, was first exhibited on December 10th, 1856, and shows from sunset to sunrise. It is 80 feet above high sea level, and may be seen 14 miles off. It is in lat. 41° 44' 34" N., long. 124° 11' 22" W., and is N. by W., 79½ miles from Cape Mendocino.

POINT ST. GEORGE.—This point lies 2 miles W. by N. from Crescent City light. It is from 50 to 100 feet high, with table-land some distance back. It is bounded by hundreds of rocks, some of which rise perpendicularly 200 feet from the water. Three or four of the largest present a remarkably white appearance, which serves to distinguish this point. The extensive reef in its vicinity may have led to confusion among the old discoverers by their confounding it with Cape Orford. The present name was given to it by Vancouver, in 1792.

DRAGON ROCKS.—This name is applied to the rocks and reef extending W.N.W. from Point St. George for a distance of six miles. The locality has never been surveyed in detail, but a wide passage exists inside of the reef, and is invariably used by the mail and coasting steamers, when entering or leaving Crescent City Bay. There are ten or twelve outlying rocks, and many sunken ones, with the passage running between them and those close to the shore. This passage is about a mile in width, has 10 fathoms in it, and the general course through is nearly N.W. and S.E., but not straight. Among the multitude of rocks on the land side of the passage, are three very large and prominent ones, about 200 feet high. It has already been stated that several of the largest rocky islets have a well marked white appearance, occasioned in part by the deposits of sea birds. The name of Dragon Rocks was given to them by Vancouver, but the general name now used is *Crescent City Rocks*.

PELICAN BAY.—From Point St. George the coast runs straight for 12 miles N. ½ W., thence W.N.W. for 9 miles, forming a deep indentation, called by La Pérouse, in 1787, Pelican Bay, and by Vancouver, St. George's Bay. For 8 miles from Point St. George the shore is low for some distance back, and fronted by a sand beach to the mouth of a small stream called *Smith's River*. The entrance to this river we looked for in vain from the deck of the steamer, although scarcely 2 miles off shore, but we were able to form a good estimate as to where it should open by the peculiarities of the northern bank, which was a low perpendicular bluff. Lat. 41° 54' N., long. 124° 11' W.

Half-way between Crescent City and the mouth of Smith's River, there is

a small sheet of water called *Lake Talawa*. North of this small stream the coast acquires an elevation of about 100 or 200 feet for a short distance inland, and is bounded by high mountains.

The 42° parallel is the boundary between the States of California and Oregon, at 14 miles northward of Point St. George. It strikes the coast near a noticeable high pyramidal mound, rising abruptly from the plateau, which is destitute of timber.

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CHAPTER V.

THE COAST OF OREGON, FROM CAPE BLANCO TO ADMIRALTY INLET.

THE Oregon Territory forms an integral portion of the United States of America, the sovereignty having been acknowledged by the treaty of July 15th, 1846, between that power and Great Britain, and is that country described in the present chapter, lying between the parallels of 42° and 49° North latitude, the former separating it from the State of California, described in the preceding pages.

The actual right of possession of the Oregon Territory was the theme of long and angry discussion, and notwithstanding the cession of the claim by Britain to its present owners, it must ever be acknowledged that their right by the usual laws of sovereignty was indefeasible.

The N.W. coast of America, in this part, was first made known to Europe by Sir Francis Drake, in his voyage in 1578, before mentioned. He reached the lat. of 48° N., and coasted southward to the harbour now bearing his name. It was next seen by the Spaniards.

We shall not dwell here upon the much-disputed accounts of De Fuca's voyage in 1592, which will be mentioned elsewhere, nor of Martin de Aguiila in 1603, nor of Admiral Bartolomeo de Fuente, or de Fonte, in 1640. All these have been denied the merit of truth, but there certainly would appear some reason for believing a portion of the first-named narrative. The next or really authentic account of any voyage to this part of the coast is from the Spanish authorities. Ensign Juan Perez sailed from San Blas in the year 1774, and after encountering storms, made the land on July 16th, in lat 54°, the South point of which was named Cape Santa Mararita, the land being what is now called Queen Charlotte's Island, and the cape, Cape North. He then made Nootka Sound, which he called Port San Lorenzo.

The next, in March, 1775, was under Captain Bruno Heceta, under whom was Perez. Don J. de Ayala has been frequently named as chief of the

expedition, but was at first in command of the second vessel, the *Sonora*. They made Port Trinidad, North of Cape Mendocino, where they left a cross, which Vancouver found in 1793. They went northward, but being separated by a storm, Heceta returned, and saw the opening of the mouth of the Columbia, which he called the Ensenada de Ascencion; it was also called Heceta's Inlet in some subsequent Spanish charts. Such are the first Spanish voyages.

In 1776, Capt. Cook left Plymouth on his last voyage, and after discovering the Sandwich Islands, in January, 1778, he made the coast 200 miles North of Cape Mendocino, proceeding northwards.

From some notices given respecting the fur to be procured on the coast during Cook's voyage, some vessels fitted out for this region from China, the first of which was under Captain James Hanna; but in 1787, Captain Berkeley discovered an inlet in $48^{\circ} 30'$. In 1788 Capts. Duncan and Colnett were on the coast; and Duncan, running down the coast from the North, anchored on the South coast of a strait off a village called *Claasit*, or *Claaset*, in $48^{\circ} 30'$.

In 1788 Capt. Meares entered this strait, and communicated his discovery to Captain Gray, of the *Columbia*, in which vessel the latter discovered the great river now known by the name. This fact is recorded by Vancouver, to whose expedition, in 1792, we owe almost the whole of our present knowledge of the coasts. In 1839, the mouth of the Columbia was surveyed by Captain Sir Edward Belcher. The American Exploring Expedition also examined the Columbia River in 1841, and part of the Straits of Juan de Fuca, afterwards more elaborately completed by Captain Kellett, in 1847. But soon after the transfer of the region to the United States that government instituted a survey of the coast, the preliminary examination being commenced in 1849 by Lieut. W. A. Bartlett, and subsequently continued by Lieuts. McArthur and Commander Jas. Alden, U.S.N. These surveys have in many instances been entirely completed. One of the earliest results of the hydrographical examination of the western coast of the United States was the establishment of the system of admirable lighthouses which now mark its prominent points.

The Hudson's Bay Company, during this period, having established settlements, derived almost the sole benefit from its productions; but in 1846 it was determined that the right of sole possession should be divided. It was against the claims of England; and the treaty before alluded to stipulated that all South of 42° should belong exclusively to the United States, the navigation of the Columbia River to be open to both parties, and indemnification granted to settlers of either nation on either side of the boundary.*

*The origin of the name "Oregon" is involved in some obscurity. It is, perhaps, first

The Columbia River and its valley is by far the most interesting and important part of Oregon, not only on account of the variety of soil, productions, and climate, but also from its being the great and only line of communication between the sea-coast and the interior. The river is 700 miles long; that portion in the western section is 120 miles in length, and from 3 to 5 miles in width; it is navigable as far as the Cascades, during its lowest stages, for vessels not drawing more than 12 feet water. The tides rise and fall above Vancouver 80 miles from its mouth, but they cause no change of current beyond Oak Point; during the freshets the Columbia rises at Vancouver 19 feet above the low-water mark.

The valley of the Columbia, as high as the Cascades, is divided into high and low prairies; the latter are not suitable for cultivation, on account of being overflowed by the annual freshets, but they are admirably adapted for grazing-lands. The soil of the upper or higher prairie is light and gravelly; it is well covered with pines, arbutus, oaks, ash, and maples; and the hills that border it are generally volcanic.

That portion of the western section of Oregon North of the Columbia which lies between it and Puget's Sound is watered by several streams, some of which flow into the Columbia on the South, others into the Pacific on the West, and others into Puget's Sound on the North. These all rise in the spurs of the Cascade Range, and drain this part of the country. The land between the Cowlitz and the Chicaylis or Chickeeles River is an extensive prairie, known as the Cammas Plains.

The country from the seaboard to the Cowlitz is covered with a dense forest of spruce pine and hemlock. The soil is a brown or black vegetable earth, with a substratum of clay. The patches of alluvial land bordering the Chickeeles River are fertile, and of some extent, studded with white oaks, and would yield good crops of wheat; they are excellent sites for farms, having an abundance of fine water, and but a short distance from water communication.

The country in the neighbourhood of Puget's Sound presents an inviting aspect, and, with the exception of some bluffs, is undulating, and covered

found in some travels in the interior of North America, in 1766-68, by Jonathan Carver, published in London in 1778. He does not state his authority for calling the river by the name of Origan, or Oregon; and it has been supposed by some that it was an invention of his own. It has also been stated that it is from the Spaniards, from the "oregano," or wild marjoram (*origanum*, Lat.) said to grow on its banks.

The native names appear to be very incapable of being rendered into European orthography. Their pronunciation is so very imperfect, that it is almost impossible to arrive at any satisfactory conclusion as to the real names, and each voyager has represented the same word in very different forms, so that an absolute standard must not be expected. Sir George Simpson gives some amusing instances of the imperfection of their powers of speech.

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with trees of the species spoken of above. The soil of this forest-land is a thin brown stratum of sandy vegetable earth, the subsoil of clay and gravel; the latter having the appearance of being water-worn. These are succeeded by the tract of prairie lands in the vicinity of Nisqually, which are valuable as pasture lands for flocks of sheep and dairy cows. These prairies have a very extensive range in a S.E. direction, and connect with the valley of the Cowlitz on the South towards the Cascade Mountains, intersected by strips of forests. Within this district are numerous ponds or lakes, surrounded by rich meadow land, furnishing luxuriant crops of nourishing herbage. No part of Oregon is better adapted for dairy purposes than this; and wheat, rye, barley, oats, &c., come to perfection.

The peninsula of Cape Flattery, North of the Chickeeles, between Puget's Sound and the Pacific, is rough and mountainous, and covered with a dense forest. The principal trees are hemlock, spruce and arbor vitæ. The high ridges which jut in all directions from Mount Olympus leave but little space for tillage, except along the western side of Hood's Canal.

The Indian inhabitants, who are scattered in numerous tribes throughout the territory, are, it is supposed, rapidly decreasing in numbers, from their dissipated lives and their rude treatment of diseases. They acted in many instances as the allies and hunters for the white men settled among them, but on more than one occasion have proved the treachery of the wild man's character.

On the coast between Cape Flattery and Cape Lookout, and up the Columbia to the first rapids, the singular custom prevails among the Indians of compressing the skulls of the infants. Thus the heads of all acquire a remarkable deformity, but which does not appear to affect their intellectual capacity.

Fish is very abundant in these regions, especially salmon; and in the subsequent pages some accounts are given of enormous quantities being found in the fresher water at the heads of the extensive and singular inlets which penetrate the coast to the northward. The salmon is of several varieties, and in the spawning season they ascend the Columbia and other rivers for 600 or 800 miles above the mouth. A singular fact occurs in this migration: one variety ascends the Cowlitz, another the Columbia, another the Willamette, &c., &c., that which is peculiar in one stream never being found in the other. When they are taken in the upper parts of the rivers they have their tails and fins nearly worn off with the effect of their long and difficult ascent of these rapid streams, and are almost unfit for food.

The climate of western Oregon is mild, having neither the extremes of heat during the summer, nor of cold during winter; this is probably owing to the prevalence of the south-west winds, and the mists which they bring with them from the ocean. The winters are short, lasting from December to February, and may be termed open. Snow seldom falls, and when it

does, lasts but a few days. Frosts are, however, early, occurring in the latter part of August, which is accounted for by the proximity of the snowy peaks of the Cascade Range, a mountain or easterly wind invariably causing a great fall in the temperature. These winds are not frequent; and during the summer of 1841 they were noted but a few times. The wet season lasts from November till March; but the rains are not heavy, though frequent. The climate during winter is not unlike that of England; and as to temperature, is equally mild with that of 10° lower latitude on our eastern coast.

Chet-ko River.—Five miles from the deepest part of Pelican Bay, and in lat. $42^{\circ} 1' N.$, long. $124^{\circ} 15' W.$ (both approximate), empties a stream, which is from 50 to 60 yards wide at its mouth, with banks about 100 feet high, and bounded half a mile in shore with very high hills. It appears deep and sluggish, and in August, 1853, was completely closed at its mouth by a heavy gravel beach. The anchorage off it is open and exposed from West to South, with several reefs in and around it. No survey or reconnaissance has been made. We found Indian huts in great numbers upon both banks, but most of the Indians were engaged higher up the stream in taking salmon.

From Point St. George to an arched rock about 40 feet high, in lat. $42^{\circ} 11'$, the course is N.W. by N. 27 miles. The coast between the Chet-ko and the point within a mile of the arch is high, bold, compact, and bordered by vast numbers of rocks, with very deep water close in shore. From this the shore runs nearly N.W. by N. $\frac{1}{2}$ N. for 40 miles to Cape Orford, making a long gentle curve of 4 miles to the eastward, and being in general high, abrupt, and rocky.

Rogue's River.—Within the long stretch just referred to is found the entrance to Rogue's River, in lat. $42^{\circ} 25' N.$, and long. $124^{\circ} 22' W.$ (both approximate), having a long, low, sandy point on the South side, and a high steep hill, with two large rocks off its base, on the North side. It comes from the interior between high mountains, and it is next to impossible to travel along its course. Just within the entrance, and on the North side, were large Indian villages in 1853.* When passing it in moderate N.W. weather, the sea was breaking heavily across the bar, and this is reported to be generally the case. It has not been examined or surveyed, and the depth of water on the bar is variously reported from 10 to 18 feet; the former doubtless nearer the truth. Mc Arthur reports 10 feet on the bar, but that the channel is too narrow for sailing vessels to turn in.

Rogue's River Reef.—The rocky islets composing this reef are not so large as the Dragon's Rocks, and run more nearly parallel with the coast line.

* The name Rogue's River was given to it from the character of the natives. On the maps it is called the *Toutounis* or *Too-too-tutna* or *Klanet*.

The southern group of rocks lies W. $\frac{1}{2}$ N., about 4 miles from the North head of the entrance to Rogue's River, and stretches northward 3 miles, where a gap occurs between them, and another cluster lying a mile and a half off shore. Off this inner group lie several dangerous sunken rocks, which must be sharply watched from aloft, when the sea is not heavy enough to break upon them. As seen from the southward, the inside rock of the outer group shows a perpendicular face eastward, and sloping back to the West. The channel through this reef is perhaps a mile wide, but more dangerous than any other on the coast. No hydrographic survey has been made of it, and it is never used by the coasting steamers.

Abreast of the northern part of this reef is a five mile stretch of low sand beach, backed by high, rugged, wooded hills, when the shore changes to an abrupt and precipitous face to Port Orford. Many rocks closely border the shore, and 5 miles South of Port Orford a high, rocky islet lies nearly a mile off the base of the hill, about 1,000 feet high.

PORT ORFORD.—This is by far the best summer roadstead on the coast between Los Reyes and the Strait of Juan de Fuca. From the extremity of the S.W. point eastward to the main shore the distance is 2 miles, and from this line the greatest bend of the shore northward is one mile. The soundings within this space range from 16 fathoms close to *Tichenor's Rock*, forming the S.W. point of the bay, to 3 fathoms within one-quarter of a mile of the beach on the N.E. side, with 5 fathoms at the base of the rocky points on the N.W. side towards Tichenor's Rock. One mile off the shores of the bay the average depth is about 14 fathoms, regularly decreasing inshore.

The point forming the western part of the bay presents a very rugged, precipitous outline, and attains an elevation of 350 feet. Its surface is covered with excellent soil, and with a sparse growth of fir. From this point the shore becomes depressed to about 60 feet at the northern or middle part of the shore of the bay, where the town is located. The hills behind are covered with a thick growth of fir and cedar.

The anchorage is usually made with the eastern end of the town bearing North, being just open to the East of a high rock on the beach, in 6 fathoms water, hard bottom, having a sharp, high point bearing N.W. by W., one quarter of a mile distant, the beach in front of the town distant a quarter of a mile, and three rocks just in the 3-fathom line E. by N., distant half a mile. Steamers anchor a little to the eastward of this position, and closer to the town in 4 fathoms. Coasters from the South in summer beat up close inshore, stretching inside of the outlying islets to avoid the heavy swell outside. Coming from the northward they keep just outside of a high rock one-third of a mile off the western head, and round Tichenor's Rock within half a mile. In winter, anchor far enough out to be ready to put to sea when a south-easter comes up. During a protracted gale in December, 1851, a terrible sea rolled in that no vessel could have ridden out. The old steamer

Sea Gull was driven northward, and lost two weeks in regaining her position, and the mail steamer *Columbia* held her own for many hours off the Orford Reef.

The usual landing is between the rock called *Battle Rock*, North of the anchorage, and the point of rock close on its West side. A road is cut from here up to the town, which consists of but a few houses. Sometimes a landing is made on the rocky beach a quarter of a mile westward of Battle Rock, in the bight, where a sloping grassy bluff comes to the water; but this landing is over a rocky bottom. A road is cut up the slope to the site of the military post of Port Orford, which is now abandoned.

From Battle Rock the shore eastward is skirted by sand beach for $1\frac{1}{2}$ mile to a rough, rocky point, called Coal Point. About midway in this distance empties a small creek, whose banks are composed of a deposit of auriferous sand and gravel, the same as found in front of the town abreast of Battle Rock, and which has yielded as high as 30 to 40 dollars per diem to each miner. Battle Rock was so named because the first adventurers made a stand against the Indians on this rock in June, 1851. *Coal Point* was so named from the reported existence of coal in this vicinity.

Several attempts have been made to open a road from this place to the mines about 60 or 70 miles eastward, but thus far without success. Several parties have gone through, but could find no direct available route for pack animals. Upon the opening of such a road it would become a large depot of supply for the interior. In the neighbourhood of Port Orford are found immense quantities of the largest and finest white cedar on the coast, and for some years a saw mill has been in operation, affording a small supply of this lumber for the San Francisco market, unapproachable in quality by any on the Atlantic coast. The high mountain about 12 miles East of Port Orford is called *Pilot Knob*. This bay was called *Ewing Harbour* in 1850 by M^r Arthur, but is now known by no other name than *Port Orford* from its proximity to Cape Orford.

It is high water in Port Orford (corrected establishment) at $11^h 24^m$; mean rise and fall 5.1 feet; of spring tides 6 feet 10 inches; neaps 3 feet 8 inches. The top of the ridge West of the town is in lat. $42^\circ 44' 22''$ N., long. $124^\circ 28' 47''$ W.

From the western extremity of Port Orford Cape Orford or Blanco bears N.W. $\frac{1}{2}$ N., distant 6 miles, the shore line between them curving eastward about a mile immediately North of Port Orford; it is composed of a very broad loose sand beach, backed by a long uniform sand ridge of 100 feet in height, covered with grass, fern, sallal bushes, and a few firs; while behind this the ground falls and forms lagoons and marshes. This ridge extends nearly to the mouth of a stream called *Elk River*, $3\frac{1}{2}$ miles from Tichenor's Rock. This narrow stream, fordable at its mouth at low tides, comes for miles through broad marshes covered with fir and white cedar, and an almost

impenetrable undergrowth. The South side at the mouth is low, sandy, and flat; the North side, a slope rising from the marsh inshore, and terminating on the beach in a perpendicular bluff, averaging 100 feet high, covered with timber to its very edge for a couple of miles, when the timber retreats some distance inland. The face of this bluff exhibits vast numbers of fossil shells in the sandstone. At its base a sand beach exists which may be travelled at low water.

CAPE ORFORD or BLANCO.—In making this cape from the northward or southward, it presents a great similarity to Point Concepcion, appearing first as an island, because the neck connecting it with the main is comparatively low, flat, and destitute of trees, with which the cape is heavily covered to the edge of the cliff. It is perhaps over 200 feet high, but the trees upon it make it appear at least 100 feet more. The sides are very steep, and worn away by the action of the sea, showing a dull whitish appearance usually, but bright when the sun is shining upon them.* At the base are many black rocks and ledges stretching out to form the inner part of Orford Reef. In the bend south-east of the cape rises a high, large, single rock, about 100 yards from the beach. The approximate geographical position of the cape is, lat. $42^{\circ} 50' N.$, long. $124^{\circ} 30' W.$, being thus the most western part of the main land until we reach lat. $47^{\circ} 50'.$

ORFORD REEF.—About 4 miles off the coast, between Port and Cape Orford lies a group of rocky islets and sunken rocks. There are seven large high ones within an area of 1 square mile, with small ones that are just awash, and others upon which the sea only breaks in very heavy weather.

The south-eastern rock is called the *Fin Rock*, and has a perpendicular face to the S.W., with a sloping surface to the N.E. Near it are several low black rocks. The *Fin Rock* lies W. $\frac{3}{4} N.$ distant $4\frac{1}{2}$ miles from the western point of Port Orford, and the general direction of the six others is N.N.W. from *Fin Rock*. West from Port Orford, and distant $4\frac{1}{2}$ miles, is a small black rock, and near it a smaller one, upon which the sea breaks only occasionally. W. by N. $\frac{1}{2} N.$, distant $4\frac{1}{2}$ miles from Port Orford, lies the largest of the seven islets, rising up with high and nearly perpendicular sides. On the same course, and a mile and a quarter further out, is a small rock, and halfway between them a rock awash. This is the northern limit of the group.

Stretching S.S.W. for a mile and a third from Cape Orford are numerous rocky islets and sunken rocks, with large fields of kelp; but ceasing at that distance a passage is left $1\frac{1}{2}$ mile wide between them and the northern islets of the other group. The course through the middle of the passage, clearing

* It was named Cape Blanco on the old Spanish maps, from the assertion of Antonio Flores in 1603, but the name Cape Orford was given by Vancouver in 1792, in honour of his much respected friend the noble Earl (George) of that title.

the rock called *Kloogueh*, off the western point of Port Orford, is N.W. by W., with 10 fathoms rocky bottom on the shoalest part of that line.

This passage is in constant use by mail and coasting steamers, but the hydrography of the reef has not yet been executed, and only a preliminary examination of the position of the outer rocks. Although the general trend of the southern group is N.N.W., it is very probable that they are a continuation of the reef making out from the cape.

One mile North of Cape Orford empties a small stream having a great number of rocks off its mouth. In 1851 it was usually called *Sikhs River*, the Chinook "jargon" name for friend. On some maps we find a stream near this locality called *Sequalchin River*. The village upon the *Sikhs* is called *Te-cheh-quut*.

Ten miles North of Cape Orford La Pérouse places a cape called *Tahelo*, but no headland exists between Orford and the South head of the Coquille, although a small stream called *Flora's Creek* empties upon the coast about halfway between them.

General Features.—From Cape Mendocino the hills upon the seaboard range from 2,000 to 3,000 feet high, running parallel with the coast at a distance of from 3 to 5 miles, receding somewhat at the Eel River Valley and Point St. George, and at other points coming abruptly to the ocean. The whole face of the country is covered with dense forests, and offers almost insuperable obstacles to the opening of roads intended to strike the trail leading along the valleys of the Sacramento and Willamut.

Northward of Cape Orford the appearance and nature of the coast assumes a marked change. Long reaches of low white sand beach occur, with sand dunes, broken by bold rocky headlands, and backed by high irregular ridges of mountains. On the sea-face and southern sides of many of these prominent points no timber grows, and they present a bright lively green of fern, grass, and bushes. The general altitude of the mountains appears the same as to the southward.

COQUILLE RIVER. From Cape Orford to the mouth of the Coquille, in lat. $43^{\circ} 7'$, the coast runs exactly North for 17 miles, with a slight curve of a mile and a half eastward, and a short distance North of Orford, consists of a low sand beach, immediately behind which are long shallow lagoons, receiving the water from the mountains, but having no visible outlet to the sea. Along this shore the soundings range from 7 to 15 fathoms at a distance of a mile.

The South point of the entrance to this river is a high bluff headland, whilst the North point is a long, low, narrow spit of sand, overlapping as it were the southern head, so that the channel runs parallel with and close under it (1851). A short distance off it lie several rocks, but not of sufficient size to lessen the western swell which breaks continually across the bar.

It drains a very fertile region, densely covered with many varieties of wood. Numerous Indian encampments were found along its banks from the mouth, and quite extensive fish weirs were discovered and destroyed. About 15 miles from its mouth there is a portage of $1\frac{1}{2}$ mile to Koos River.

The hydrographic reconnaissance of this river in 1859 by the Coast Survey shows only 3 feet of water on the bar, and it is reported inaccessible for vessels of ordinary draught. The North point is a long stretch of dreary sand dunes, and has a single bold rock at its southern extremity. The channel makes out straight from the southern head, and North of the rocks (1859).

The approximate position of its entrance is, lat. $43^{\circ} 7' N.$, long. $124^{\circ} 24' W.$

CAPE GREGORY or Arago.—Between the Coquille River and this head-land we find another low sand beach for ten miles to the southern part of Gregory, which rises up very precipitously, the hill attaining perhaps 2,000 feet elevation 2 miles back, runs in a straight line northward for 3 or 4 miles, and bounded by many rocks, slopes to the northward to a sharp perpendicular point, about 60 feet high, and peculiarly cut and worn by the action of the sea. Thence it takes a sharp turn to the E.N.E. for 2 miles, to the entrance of Koos Bay. The cape, as seen from the southward, shows a couple of rocks a short distance from its western point. Along the low shore, soundings in 10 fathoms are found 1 mile off. We have been informed that vessels anchoring under the North face of the cape may ride out heavy S.E. gales.

If so, it is very important, no other place between Sir Francis Drake's and Neé-ah Bay, except, perhaps, under Destruction Island, affording that protection. If a south-easter should haul to the S.W., and then N.W., as they usually do, the chances of getting out would be very few.

It was named by Captain Cook, who placed it by bearings in lat. $43^{\circ} 30'$, and is described by him as follows: "This point is rendered remarkable by the land of it rising immediately from the sea to a tolerable height, and that on each side of it is very low." Vancouver placed it in $43^{\circ} 23'$.

The **LIGHTHOUSE** on Cape Gregory (or Point Arago) was first illuminated on November 1st, 1866. It stands on a small island at the western extremity of the cape, the keeper's white house being near it, at the South end of the island. The tower is of iron, painted white, and showing a *fixed* white light, varied by a *flash* and eclipse, each of 3 seconds duration, every 2 minutes; elevated 75 feet, visible 15 miles off; lat. $43^{\circ} 20' 38''$, long. $124^{\circ} 22' 20'' W.$

It is sometimes called by the recent appellation of Arago, which has been adopted on the coast survey charts. It is known by both on the western coast.

KOOS BAY.—Nearly 2 miles E.N.E. of the northern extremity of Cape

Gregory is the wide and well-marked entrance to Koos Bay. The South point, named Koos Head, is high and bold, being the base of the hills forming the cape, whilst the North point is low and sandy, with shifting sand dunes that reach 100 feet in height. In 1861 a narrow channel cut across the North point, forming a tolerably large island, which was washed away before the close of the season. Such changes are constantly taking place, and involve changes in the bar and channel. The points lie nearly North and South of each other, and about three-quarters of a mile apart. The bar (1861) lies N. 62° W. 1 mile from Koos Head; N. 35° E. 1½ mile from Cape Gregory; and its width between the 12-foot lines on the North and South sides is only 150 yards, with a maximum depth of 13 feet. Thence the channel, increasing in width, runs straight to the North tangent of the head, with 10 fathoms of water at that point. In 1853 and 1854 a depth of only 9 to 9½ feet could be found on the bar. During the working season of 1861 the bar moved to northward, thus indicating great changes in this as in all other river bars on the coast. Vessels enter and leave on the flood-tide, because the bar is smoother; with the ebb there is a heavy break, unless the sea be remarkably smooth. The currents run very strongly, as might be supposed from the extent of the bay and size of the channel.

Traffic is drawn hither by the mining of lignite, which is carried to the San Francisco market; it has been found unfit for steamship consumption, but is used for small stationary engines and domestic purposes. The geology of the country does not give promise of coal. A tug-boat is employed at the entrance for towing vessels over the bar. The saw-mills on the bay turn out about 15,000 feet of lumber daily. Koos Head is in lat. 43° 21' 4" N., long. 124° 18' W. High water at 11^h 26^m; springs rise 6.8 feet; neaps 3.7 feet.

The bay is very irregular in outline, and its general shape is like the letter U, with the convexity to the North. One small branch stretches southward behind Koos Head; it is called the South Slough, and has but 2 or 3 feet of water in it. North of the entrance the bay proper begins, and has a good depth of water. Abreast of the North point the width is 600 yards, and the depth from 3 to 7 fathoms; thence northward it increases in width to nearly a mile, and runs very straight on a N. by E. ½ E. course. The channel runs on the eastern side of this part, the western half being filled with sand flats and shallows. A sunken rock called the Fearless Rock, is on the eastern side of the channel, abreast of the upper part of the rocky shore. The whole length of the bay is believed to be about 25 miles, the head of it being a little farther South than the entrance. Koos River empties into the head of the bay, and will give passage to boats for 20 miles from its mouth, where a small slough that empties into the Coquille River

North Pacific.

is so near as to leave a portage of only a mile and a half between the two waters, and about 15 miles from the mouth of the Coquille.

Excepting the peninsula, which forms the western shore of the bay North of the entrance, the entire country is an immense forest of various kinds of pines. No land for cultivation is found without clearing, and even on the Koos River the bottom lands, which afford excellent soil, have to be cleared of the thick growth of laurel, maple, and myrtle. The coal mines are beyond the great bend, near the head of the bay, and on the western side.

The name Koos is that approaching nearest the Indian pronunciation of the word. On some maps we find a small stream called Cahos or Kowes, emptying just South of Cape Gregory.*

UMPQUAH RIVER.—North of Koos Bay to the Umpquah River is another straight low sand beach, with sand dunes, backed by a high ridge of hills densely timbered. The shore runs nearly North, presenting a very white appearance when the sun shines upon it, and having from 10, to 15 fathoms of water 1 mile off the beach. The southern point of the entrance to the river is a marked spur of the mountains from the S.E., and is bordered by sand dunes. The North side of the entrance is a long range of white shifting sand hills, running with the coast for two miles, and suddenly changing to high rocky hills, covered with wood. The river is the largest stream entering the Pacific between the Sacramento and Columbia rivers. It is 51 miles N. $\frac{1}{2}$ W. from Cape Orford, and 21 miles North of Cape Gregory. The lower reach of the river is long and narrow, running nearly North for 6 miles; bordered on the South side by a rocky wooded shore, on the North, for 2 miles, by loose sand-hills, changing, after the first mile, to sand sparsely covered with coarse grass, bushes, and fir, and in 4 miles to steep, high, rocky banks, covered with large trees. An immense flat, mostly bare at low water, stretches South from the North point to within 300 yards of the South side of the entrance, through which narrow space runs the channel, having (1853) a bar with only 13 feet upon it, and less than 100 yards wide. From the bar the point of bluff just inside the entrance bears N.E. by E., and is distant $1\frac{1}{4}$ mile. About 1851 or 1852 two range marks were placed on the South shore for running in by, and they are frequently referred to as data by which to trace the changes of the bar, but the captain who erected them has assured us that the bar was not on their range, but to the southward of it.

Buoys for crossing the bar.—In January, 1853, it was announced that the bar had been marked by buoys. Two third-class nun buoys, painted white, with white and black perpendicular stripes, are placed in line with the light-house, which bears from them E. by N. $\frac{1}{4}$ N. The inner buoy is just within

* The word Koos signifies in the Too-tee-tan language a lake, lagoon, or landlocked bay. Dutot de Moiras very amusingly translates it R. de Vaches (cows river).

the bar, and in $3\frac{1}{2}$ fathoms at mean low water, and can be passed on either hand, but only close to it. The outer buoy is just outside the bar, in 10 fathoms at the same stage of the tide, and can also be passed on either hand. Keeping the two buoys in range with the lighthouse, 14 feet may be carried over the bar at mean low water.

A *lighthouse* was erected on the South side of the entrance close to the beach, which is of shifting sand. It first showed a fixed light in 1857, but in 1866 it was extinguished. It was not stated whether the tower, &c., was removed.

From the bar the lighthouse bears E. by N. $\frac{1}{4}$ N., distant about a mile (1858). After crossing the bar the channel, when approaching the lighthouse, runs close to the South shore, and increases in depth from $3\frac{1}{2}$ fathoms to 13 off the point of bluff. Abreast of the meeting of the sand beach and bluff on the South side lies a rock, visible at extreme low tide, upon the 3-fathom line. It is not laid down on any chart, nor has its position been accurately determined. It has deep water around it. From the point of bluff vessels steer across the river to strike the East side of the North point about one-third of a mile from its extremity, then haul across E.N.E. to the other shore, close along which the channel runs. This course takes them clear of a flat and rocks in mid-river, and bearing E.N.E. from the South end of the North point, and North five-eighths of a mile from the point of bluff on the South side. The small indentation of the shore-line on the right, after making the first stretch from the point of bluff, is called Winchester Bay, having no water, and being but an extensive mud-flat. Three miles inside the lighthouse the river continues half a mile wide, then expands to a mile, and is filled with numerous extensive sand and mud flats. Five miles from the lighthouse it bends sharply to the eastward.

This river is said to drain an extremely fertile region, abounding in prairie land, well adapted to agriculture and grazing. Ross Cox mentions a pine tree discovered in the Umpquah valley measuring 216 feet to its lowest branches, and being 57 feet in circumference. The Indian name for the river below the rapids is Kah-la-wat-set, and to the upper part they apply the name Umpt'quah.

From the Umpquah the coast runs in a remarkably straight line N. by W. $\frac{1}{4}$ W. to the South point of the entrance to the Columbia River, in no case varying more than 3 miles eastward of the line joining these two places.

HECETA BANK.—N.W. by N., distant 66 miles from Cape Orford, is the southern end of a bank extending parallel with the coast for 30 miles, and about the same distance from it. The least depth yet discovered upon it is 43 fathoms, and the nature of the bottom very variable, there being blue mud, coarse blue sand, coral, pebbles, gravel, mud, and shells. Coasting vessels have often reported passing over localities having a heavy swell

upon them, and one frequently so reported near the Umpquah led to the examination which discovered this bank. When Heceta was upon this coast, and in this vicinity, he said, "On Sunday I found great differences (of depth) at 7 leagues. I got bottom at 80 fathoms, and nearer the coast I sometimes found no bottom." Should a thorough examination of his discoveries here satisfactorily show that he did really cross this or any yet undiscovered adjacent bank, it would be a tribute to his explorations on this coast to apply his name to it.

CAPE PERPETUA.—After leaving the Umpquah 2 or 3 miles, a bold rocky coast, with high steep hills covered with timber, runs straight for about 8 miles, changing to low sandy beach with sand dunes, backed by a high ridge of hills. This continues for 15 miles, when the hills stretch out to the shore and crowd upon it for 13 miles, to end abruptly in steep bluffs forming Cape Perpetua, which is 39 miles N. by W. $\frac{1}{4}$ W. from Umpquah light, with an approximate geographical position of lat. $44^{\circ} 19'$, longitude $124^{\circ} 6'$. The face of the cape is nearly 5 miles long, with very slight projection from the straight trend of the shore. It is very high, and has a regular though steep descent to the shore, bringing the trees to its very edge.

From the Umpquah to Cape Perpetua, at a distance of a mile from the shore, soundings are laid down from 8 to 14 fathoms.

This cape was named by Cook in 1778, and by bearings placed in latitude $44^{\circ} 6'$. Vancouver, in 1792, gave its position in latitude $44^{\circ} 12'$.

To the northward of Perpetua the coast range of hills is cut by numerous valleys, through which flow many small streams to the ocean.

Yaquinnah River.—Nine miles North of Perpetua is the mouth of a stream believed to be the Yaquinnah. It is said to expand into a bay, 3 miles long by $1\frac{1}{4}$ wide, running nearly East, and very much contracted at the middle, where a small islet exists. The South head to the entrance is formed by a spur of the hills from Perpetua. The North point has likewise a bold head, with a low sand-spit stretching South half a mile. The entrance is in lat. $44^{\circ} 27' N.$ (approximate). The names of the streams hence to the northward are very conflicting, and will continue so until a land exploration is made along the seaboard for determining their peculiarities and the latitudes of their mouths.

Celetse River.—North of Perpetua the shore continues straight, high, and bold, for 5 miles, when a cluster of rocks occur, and the bluff changes to low sand beach, running nearly to the mouth of a small stream, about 5 miles South of Cape Foulweather, called the Alseya on the coast survey reconnaissance of 1850, and the Celetse on the original sheets of 1853. This name is the proper one. The North head, which is bold, has a rock close under it. Thence the shore is low and sandy to Foulweather. The

country in the interior is very broken and mountainous, and covered with wood.

CAPE FOULWEATHER.—From Perpetua to this cape the soundings range from 7 to 12 fathoms about a mile from shore. The cape is in lat. $44^{\circ} 45'$ North, and longitude $124^{\circ} 4'$ West, and forms a high bold headland, half a mile in width, jutting out about half a mile from the low beach, and backed by high mountains. It is covered with wood, and has several small rocks on its S.W. face, with one rocky islet a mile from it. To the northward of the cape are three rocky islets standing a short distance from the low beach, and readily distinguished by being projected against it.

This cape was named by Cook on the day he made the coast, March 6th, 1778, but the point of the headland is not that referred to by him. At noon he was in latitude $44^{\circ} 33'$, and the land extended from N.E. $\frac{1}{2}$ N. to S.E. by S., about 8 leagues distant. In this situation he had 73 fathoms over a muddy bottom, and 90 fathoms a league further off shore. The land he describes of moderate height, diversified by hills and valleys, and principally covered with wood. No striking object presented itself, except a high hill with a flat summit, which bore East from him at noon. This may have been what he subsequently called Cape Perpetua. At the northern extreme the land formed a point, which he named Cape Foulweather, from the exceeding bad weather he met with soon after. The expression "northern extreme" has led some geographers to place the cape as high as lat. $45\frac{1}{2}^{\circ}$, but he judged the Foulweather he named to be in $44^{\circ} 55'$. Being here driven off the coast by continued bad weather, he had no opportunity to verify his position, and did not sight the land again till in lat. $47^{\circ} 5'$, thus passing by the entrance to the Columbia. Vancouver places it in lat. $44^{\circ} 49'$. Both of these determinations evidently refer to the northern part of the high land.

Nekas River.—Soon after passing Foulweather the shore becomes abrupt and moderately high, with an increased depth of water immediately off it. Four miles South of the Nekas, which is in lat. $44^{\circ} 56'$, it changes to low sand dunes, stretching into a narrow point, forming the South point of the stream, while the North point is a low bluff. The entrance is very narrow and shoal, and inside the river is reported to spread out into a bay of about a mile in extent, and to receive the waters of a stream draining a valley coming from the eastward.

From the Nekas to Cape Lookout the distance is 24 miles, and course N. by W. $\frac{1}{2}$ W., with a shore-line broken by several small streams, amongst which are the *Nechesne*, in lat. $45^{\circ} 2'$, with rocks in the entrance; the *Nes-tuggah*, in lat. $45^{\circ} 8'$, called *Yaquinnah* in reconnaissance of 1850, and having a large rock off its mouth; the *Nawuggah* in lat. $45^{\circ} 14'$, and on the South side of whose entrance is a single rocky islet, hereafter referred to.

De Mofras has C. Lucuat in this latitude, and a small stream, River Kaouai, South of it.

CAPE LOOKOUT.—The soundings from Foulweather to this cape show from 13 to 31 fathoms of water at a distance of a mile from the shore, increasing from 18 fathoms North of lat. 45° N.

This cape is situated in lat. $45^{\circ} 20'$, long. $124^{\circ} 0'$. It projects somewhat sharply into the sea for half a mile, and, as seen from the South, the top is tolerably flat and regular, and at the highest part we judge it to attain an elevation of 3,000 feet. The face directly toward the ocean is perpendicular, high, and towards the South destitute of trees. About 8 miles southward of it is a large single rock off the Nawuggah, estimated to be 250 feet high, and standing well out from the low sand beach behind it. No rocks lie off this cape, but one appears very close inshore, about a mile to the northward of it.

CAPE MEARES.—Two or three miles after leaving Cape Lookout the land falls to a low sand beach, behind which is a long lagoon, called the Nat-a-hats, stretching northwards, and having an opening under the South head of the well-marked point to the northward, which is the termination of a spur or ridge, running from the south-eastward, presenting an abrupt front to the ocean for about 2 miles, and being part of the western boundary of Tillamook Bay. In coming down this coast in the fall of 1857 we made a few notes upon some objects, and find the following memorandum made whilst near this point: "Three high rocks (one arch) off point S. of False Tillamook; one more on the North side." Not being then aware of any doubt as to the name of the cape, no other particulars were noted. Four rocks were laid down off the S.W. face on the coast survey reconnaissance of 1850, and one on the North. Three large rocks and one small one are laid down off the S.W. face in the original sheets of the reconnaissance of 1853, the most distant being 1 mile from shore, with several small ones between them and the shore, and two or three others off the N.W. face.

TILLAMOOK BAY.—On the coast survey reconnaissance of 1853 the entrance to this bay is placed in latitude $45^{\circ} 34'$, 4 miles North of Cape Meares. The southern point is low, and the termination of a spur from the crest of the cape, whilst the North head is high and bluff. The entrance is very narrow, and reported to have very little water upon the bar; inside it expands into a long wide bay, stretching to the S.S.E. behind Cape Meares. No survey has yet been made of it, and some doubts are expressed about the enlarging of the river to form a bay. Two miles northward of the northern head stands a couple of large rocks; thence the coast runs nearly straight to False Tillamook, receiving a considerable stream, called the *Nehalem*, in lat. $45^{\circ} 41'$. Clarke, when about 5 miles South of Tillamook Head, says that "the principal town of the Killamucks is situated 20 miles lower (South) at the entrance to a creek called Nielee, expanding into a bay

which he named Killamuck Bay. Upon this bay were several Killamuck towns. Killamuck River is at the head of the bay, 100 yards wide, and very rapid; but having no perpendicular fall, is a great avenue for trade. There are two small villages of Killamucks settled above its mouth, and the whole trading portion of the tribe ascend it, till by a short portage they carry their canoes to the Columbia valley, and descend the Multnomah to Wappatoo Island. This information he obtained from Indians and traders. On this short expedition he made all his distances from Cape Disappointment and Point Adams too great, and reducing the forementioned 20 miles by the proper proportion, it would give us 13 miles as about the position of the Nehalem. His name seems to agree with this, but the description applies to what is generally known as Tillamook Bay.

The shore about the Nehalem is low and sandy, with sand dunes backed by high wooded hills, and cut up by many valleys. It was here that Meares stood in for an anchorage (July, 1788) until he found bottom in 10 fathoms, but hauled out again, and named the place Quicksand Bay, and the adjoining headland North, Cape Grenville.

CAPE FALCON, or False Tillamook.—The northern part of this headland lies in lat. $45^{\circ} 47'$, long. $127^{\circ} 58'$. Upon passing close by it in 1857 we judged it to be not less than 3,000 feet high, with the sea face coming precipitously to the ocean, and off it lie two prominent rocky islets. As seen from the southward the top is irregular, while the hills inshore fall away. Like some other points in this latitude, the southern face of the cape is destitute of trees, but covered with a thick growth of grass, bushes, and fern. Two miles South of it is a stretch of sand beach and sand dunes.

From Cape Lookout to this headland a depth of 20 fathoms may generally be found a mile from shore; but, as upon the whole coast, a heavy regular swell always rolls in from the West.

TILLAMOOK HEAD.—This prominent Cape, in lat. $45^{\circ} 58'$, is 12 miles N.N.W. from Cape Falcon, and 19 miles S.E. by S. $\frac{1}{2}$ S. from Cape Disappointment. The coast from Cape Falcon curves 2 miles eastward; is bold and rugged, guarded by many high rocky islets and reefs, and in several places bordered by a low sand beach at the base of the cliffs. Two miles South of the Head, Clarke (1805-6) locates a creek 80 yards wide at its mouth, which he calls Ecola, or Whale Creek. From the South bar of the Columbia River the summit of Tillamook appears flat for some distance back, and has an estimated height of 2,500 feet. Off the face of the cape, which is very steep, lie several rocky islets; one of them is high and rugged, and stands out about a mile from the S.W. face. Around it the water is believed to be deep, as we have seen a steamer come almost upon it in a thick fog, but inside of it lie several high rocks. From the bar two rocks can be distinctly seen, the inner being the larger, and its apparent distance from the head about half the apparent height of the cape. Whether the

smaller is the one off Cape Falcon, we did not determine. As seen from the southward, the large rock has a perpendicular face to the westward, and slopes to the East. It is the resort of thousands of seals.

This cape is a good land-mark for making the mouth of the Columbia River, no such high headland occurring on the coast northward of it for over 70 miles, and before being up with it the moderately high land of Cape Disappointment is seen, and made as two islands.

The face of the cape is much broken, and formed principally of yellow clay, presenting a bright appearance in the sunlight. Clarke says that 1,200 feet above the ocean occurs a stratum of white earth, then (1805-6) used by the Indians as paint; and that the hill-sides slip away in masses of 50 to 100 acres at a time.

Upon the top of the cape Clarke says he found good, sound, solid trees growing to a height of 210 feet, and acquiring a diameter from 8 to 12 feet.

From Tillamook Head southward many miles was the country of the Killamuck Indians, then estimated to number 1,000 people, and having 50 houses. The coast from Point Orford to Tillamook Head is well diversified by high hills and valleys, presenting a country well watered by numerous small streams emptying into the ocean. It is densely covered with various woods, and for a few miles inland looks favourably from the deck of a vessel. Some distance in the interior ranges of mountains occur, the general direction of which appears to be parallel with the coast line, which attained its greatest elevation and compactness between Cape Falcon and Tillamook Head, after which a sudden and marked change takes place, and a stretch of low sandy coast commences, and runs for nearly 100 miles northward, only broken by Cape Disappointment.

COLUMBIA RIVER.

This river, by far the most considerable of any that enter the sea on this side of the Pacific, is the principal feature of the territory it waters. If its capabilities were at all commensurate with its magnitude, it would really become an important point in the commercial history of the Pacific. It has some almost insuperable obstacles to its becoming of any great service to the country it drains.

The entrance to the Columbia is impracticable for sailing vessels for two-thirds of the year. It cannot be safely entered at night, and in the day only at particular times of the tide and direction of the wind. Unlike all known ports, it requires both the tide and wind to be contrary to ensure any degree of safety.

Vessels frequently lie for several weeks in Baker's Bay, inside the entrance, during the winter, for fine weather to get out, for which a fair wind and smooth water are indispensable. The difficulties of ingress must

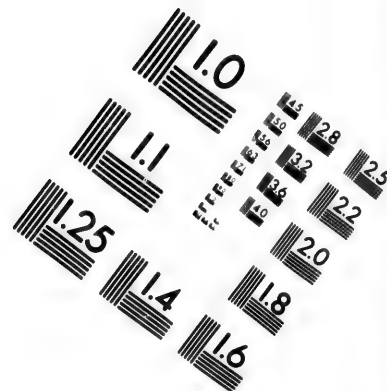
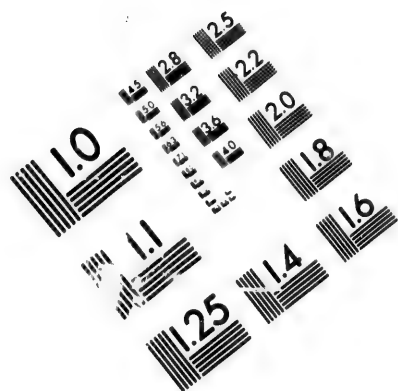
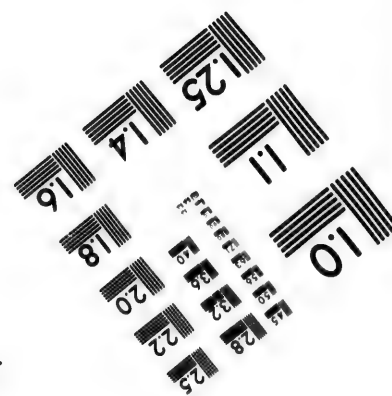
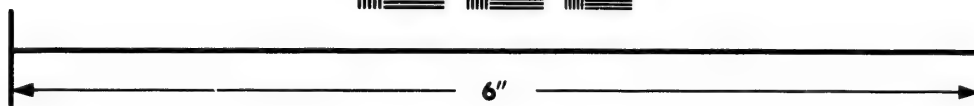
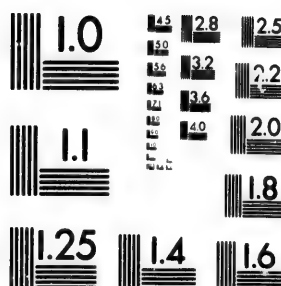


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also be greater, inasmuch as a vessel in the open ocean cannot watch her opportunity so conveniently as when at anchor in Baker's Bay; and the hazard would be still greater were it not that the openness of the coasts, and the prevalent gales, lessen the hazard of a lee-shore.

"But these obstructions, in proportion as they lessen the value of the river, enhanced at the same time the merit of the man who first surmounted them—a merit which cannot be denied to the judgment, and perseverance, and courage of Captain Gray, of Boston. Whether or not Captain Gray's achievement is entitled to rank as a discovery, the question is one which a bare sense of justice, without regard to political consequences, requires to be decided by facts alone. First, in 1775, Heceta, a Spaniard, discovered the opening between Cape Disappointment on the North, and Point Adams on the South,—a discovery the more worthy of notice, inasmuch as such an opening can hardly be observed excepting when approached from the westward; and being induced partly by the appearance of the land, and partly by native traditions as to a great river of the West, he filled the gap by a guess with his Rio de San Roque. Secondly, in 1788, Meares, an Englishman, sailing under Portuguese colours, approached the opening in question into 7 fathoms water, but pronounced the Rio de San Roque to be a fable, being neither able to enter it nor discover any symptoms of its existence. Thirdly, Gray, though after an effort of nine days he failed to effect an entrance, was yet convinced of the existence of a great river by the colour and current of the water. Fourthly, in April, 1792, Vancouver, while he fell short of Gray's conviction, then unknown to him, correctly decided that the river, if it existed, was a very intricate one, and not a safe navigable harbour for vessels of the burden of his ship. Fifthly, in May, 1792, Gray, returning expressly to complete his discovery of the previous year, entered the river, finding the channel very narrow, and not navigable more than 15 miles upwards, even for his *Columbia*, of 220 tons. According to this summary statement of incontrovertible facts, the inquiry resolves itself into three points—the discovery of the opening by Heceta, the discovery of the river by Gray on his first visit, and the discovery of a practicable entrance by the same individual revisiting the spot for the avowed purpose of confirming and maintaining his previous belief. Gray thus discovered *one* point in a country, which, as a whole, other nations had discovered, so that the pretensions of America had been already forestalled by Spain and England."—*Sir George Simpson*.

The Columbia River possesses but few advantages as a port; the difficulties and dangers of its entrance, which have been manifest to all who have come hither since its first discovery, have not been exaggerated, and without very efficient means be at command for towing ships over the bar into the quieter water within, it will be almost impossible for a ship to enter in safety. One feature which renders it still more difficult for a sailing vessel

to cross the bar is, that a good and commanding breeze within or without the mouth often falls to a calm when the breakers are reached. The shifting of the shoals forming the bars and entrances, which they do apparently very considerably at short intervals, increases the difficulty, from the impossibility of having any established marks for the guidance of the commander that will be good for a lengthened period.

In addition to this, the cross-tides, and their great velocity, increase the difficulties. The heavy swell of the Pacific, and the influence of an under current, add their embarrassments, and all these become greater from the distance of the leading marks of the channel, and their indistinctness when the weather will permit entrance. It is necessary to use them, because the compass bearings are of little or no use. The land near it is well marked, and this is some little advantage.

The first complete survey that was made of the river was that by Sir Edw. Belcher, in H.M.S. *Sulphur*, in 1839, which showed some remarkable changes from the charts of 1792. The northern channel up to Cape Disappointment was then the only known good entrance. The U.S. Exploring Expedition, in 1841, also examined it, and found but one channel, but that was little changed. The next advance in its hydrography was the discovery of the South channel, in January or February, 1850, by Captain White, who found not less than 4 fathoms on the bar. In 1851 the U.S. Coast Survey officers under Lieut. W. P. M'Arthur, completed a preliminary survey of the outer entrance, since which period no complete examination has been published; but in 1869 a survey was made by Mr. E. Cordell, U.S. Coast Survey, which showed that the North channel had very much altered and was unsafe, except for small vessels. To these authorities, and to the directions drawn up by Mr. Geo. Davidson, combined with our former observations, we owe the following remarks:—

POINT ADAMS.—Two miles northward of Tillamook Head commences a peculiar line of low sandy ridges, running parallel to the beach towards Point Adams, and appearing like huge sand-waves covered with grass and fern. Between some of them run small creeks, whilst the country behind is low, swampy, and covered with wood, and an almost impenetrable undergrowth. About 3 miles North of the head, Clarke says a beautiful stream empties, with a strong rapid current. It is 85 yards wide, and has 3 feet at its shallowest crossing.

Point Adams is low and sandy, covered with bushes and trees to the line of sand beach and low dunes; and although it is reported to have washed away over half a mile since 1841, we find comparatively small changes since the survey of Broughton in 1792.

No lighthouse exists here, but the necessity for one has been so repeatedly urged that we cannot refrain from calling attention to a few facts bearing upon the question. Off this point S.W. by S. $3\frac{1}{4}$ miles lies (1852) the bar

of the South channel, through which the far greater portion of the trade has passed; and all vessels use this point as a standard point for their ranges. During the early part of the evening dense fogs, formed over the waters of Gray's and Shoalwater bays, are brought southward by the summer winds, and roll over Cape Disappointment, which they completely shut in before reaching across the river, so that a vessel might make a light on Point Adams, when the other cape was invisible; but by seeing both lights a vessel could hold any required position at night near either bar, and run in and take a pilot upon the first opportunity; for it would be assuming too great a risk to enter the river at night or without a pilot.

The beach around Point Adams, and to the southward some distance, is usually called *Clatsop Beach*.*

On Point Adams some missionaries were established in 1841. Captain Wilkes visited these pioneers in the wilderness. In walking on the sand-hills, and about Point Adams, he says that he had never in all his life seen so many snakes as were on the beach, where they were apparently feeding at low water.

Clatsop village, near the mission, consists of a few rough Indian lodges, constructed of boards, or rather large hewn planks. On the Clatsop beach he saw a great number of dead fish. Mr. Birnie informed him that they were thrown up in great numbers during the autumn, and were supposed to be killed by a kind of worm generated in their stomachs.

CAPE DISAPPOINTMENT.†—The North side of the Columbia River forms part of Washington Territory; it was the southern boundary of the "New Georgia," of Vancouver, 1792.

This cape is the only headland from Tillamook to latitude $47^{\circ} 20'$ that breaks the low line of shore. It presents a geological formation not before met with on the sea board, being composed of horizontal columnar basalt, rising to an elevation of 287 ft., disposed in succession of huge round hills, broken on the sea front by short strips of sand beach, and covering an irregular area of about 3 miles by one. Inland of their crests the trees com-

* Upon Clatsop Beach, many years ago, before the whites occupied the country, a Chinese or Japanese junk, with many hands, and a cargo of beeswax, was cast ashore, and went to pieces, but the crew were saved. In support of this Indian tradition, there are occasionally, after great storms, pieces of this wax thrown ashore, coated with sand, and bleached nearly white. Formerly a great deal was found, but now it is rarely met with.

† This cape was seen by De Heceta, in August, 1775, and again by Captain Mears, in July, 1788, when he called it *Cape Disappointment*, by which name it is still known. In 1792, Gray, the real discoverer of the river, called it *Cape Hancock* afterward, but relinquished this term. It is still, however, applied to it in some works. The Indian name is *Kah-cese*.

mence, and their tops reaching above the summits of the hills increase their apparent height. The in-shore slope of the hills is more gentle, so that paths can be easily carried to their tops. When the evening fogs, which are very regular from the northern bays, do not cover the cape, we have sometimes experienced a dense fog rolling down the river about sunrise, enveloping everything below the top of the cape.

As seen from the southward, when off Tillamook Head, Cape Disappointment is made as two round-topped islands. Approached from the N.W., it rises in a similar manner; from the West and S.W. it appears projected upon the mountains, but the slightest haziness in the atmosphere brings it out in sharp relief. This cape being basaltic, and showing an almost iron front to the river and sea, it is impossible that in the memory of many, Cape Disappointment has been worn away some hundred feet by the sea, and strong currents that run by it.

The **LIGHTHOUSE** is not upon the top of the cape, but upon a spur a little to the West of the S.E. point, and about 95 ft. below the highest part. The tower is whitewashed, placed 192 ft. above the level of the sea, and being 40 ft. in height, and projected against a dark green background, shows well in daylight. It is in lat. $46^{\circ} 16' 32''$ N., long. $124^{\circ} 2' 13''$ W.

The light is a *fixed white light*, of the first order of Fresnel, was first exhibited October 15, 1856, and shows from sunset to sunrise. It is elevated 230 ft. above the sea, and may be seen 22 miles off.

A *fog-bell* of 1,600 pounds has been placed on the bluff in advance of the light-tower, and will be sounded during foggy or other thick weather, night and day.

The **Entrance** to this the great river of the Pacific coast is 5 miles wide between the nearest parts of Cape Disappointment and Point Adams, bearing S. $58\frac{1}{2}^{\circ}$ W. from each other; but the passage is badly obstructed by shifting shoals that lie 2 or 3 miles outside of the line joining the points. The numerous surveys that have been made of this river prove so conclusively the great changes which the channels through the shoals undergo, that the subsequent remarks on the North and South channels must be used with great caution. The best advice we can offer is, when up with the bar, *wait for a pilot*. The mail and coasting steamers, in 1857, entered the South channel parallel and close to the beach South of Point Adams; but with a heavy swell from the westward they roll very much after rounding the point. In heavy weather some of them preferred entering the N. channel, although gives a detour of some miles.

In 1868 it was announced that the North channel had changed so much that it was considered unsafe, and only to be used by vessels of very light draught.

Sailing vessels cannot beat into the South channel against the summer winds blowing from the N.W., but almost invariably come out through it.

The heavily laden vessels of the Hudson's Bay Company have always used the North channel.

During heavy weather, and especially in winter, the sea breaks with terrific fury from N.W. of Cape Disappointment well to the southward of Point Adams, and we remember the mail steamer trying for 60 hours to find the smallest show of an opening to get in. Sailing vessels have laid off the entrance six weeks, waiting for a fair opportunity to enter, and many lie inside for weeks trying to get out. The mail steamer meanwhile, exerting all her power, would drive through the combers, having her deck swept fore and aft by every sea. Few places present a scene of more wildness than this bar during a S.E. gale, contrasting strongly with many times during the summer, when not a breaker is seen to mark the outline of the shoalest spot. In bad weather the pilot boats cannot venture out, but a steamer might; and the mail steamers, to avoid delay, now regularly carry a bar pilot with them.*

During the season of freshets, about June, the pilots say that the river brings down such a vast body of water, that they can frequently take up for use fresh water upon the bar.

When off the entrance in fine clear weather, the beautiful snowy peak of *Mount St. Helens* shows over the lowest part of the land inside, and apparently in the middle of the river valley. It is very regular in outline, and presents a pyramidal appearance, having a base equal to either side. It is over 75 miles eastward from the entrance to the river, and attains an estimated elevation of 13,500 ft. It is volcanic, and occasionally discharges volumes of smoke.†

The *South Channel*, which passes between the outer Middle Sand and the bank abutting on Point Adams, has nowhere less than 24 feet water at any time of tide. It is now the only practicable entrance, and passes between the south-western extension of the Middle Sand, and the bank against Point Adams. The *Middle Bank* is extensive, and stretches for $4\frac{1}{2}$ miles southward of Cape Disappointment, its eastern edge being $2\frac{1}{2}$ miles off from the low land of Point Adams, leaving a channel three-quarters of a mile wide between it and the bank against the latter point. Its general course is N.N.E. and S.S.W., the depth varying from $3\frac{1}{2}$ to $9\frac{1}{2}$ fathoms.

Two buoys were laid down in 1868, to show its direction. The outer, or No. 1 buoy, Fairway, a mammoth buoy of the first class, striped vertically

* An evidence of the danger of the entrance was afforded by the wreck of the barque *Oriole*, which sunk in the endeavour to enter, on September 19th, 1853. The vessel and cargo were totally lost, but the crew saved. She had on board the materials for the *light-house*, since erected on Cape Disappointment.

† On November 23rd, 1842, during an eruption, the ashes fell from it over the Dalles of the Columbia like a fall of snow. St. Helen's and Rainier were both in action.

black and white, lies in 12 fathoms water, with Cape Disappointment light-house bearing N. by W. $\frac{1}{2}$ W., and Point Adams N.E. distant 4 miles. No. 2 buoy, also a first class mammoth buoy, *red*, bears North $2\frac{1}{2}$ miles from the outer buoy No. 1, in $5\frac{1}{2}$ fathoms water, with Cape Disappointment Light-house N.N.W. $\frac{3}{4}$ W., Point Adams E. $\frac{1}{2}$ N., and the West end of Sand Island N. by E.

The following directions were given in 1851 by Lieutenant McArthur, and are in some degree applicable to the present state of the entrance; but they were drawn up before the light on Cape Disappointment, or the buoys before named, were established.

To enter by the South Channel, and up to Astoria, bring Point Adams in range with Flat or Table Hill, which will be seen a little to the northward of Pillar Hill Tree (remarkable as appearing like a tower on a high hill), and keep on this range (or Point Adams and Pillar Hill Tree will answer for light draughts), until the bar is crossed and the beacon on Sand Island bears N. 40° E., true (N.E. by E. $\frac{1}{2}$ E. by compass). The vessel will then be in the South Channel in the best water.

Steer for the beacon, taking care not to sag to the eastward, but rather keep close to the breakers on the Sand Island shore; pass close to Sand Island, and fall into the range of the beacon with Cape Bluff. Keep on with this range astern in the Clatsop Channel until the custom-house is on with Astor Point, when haul to the East on that range, running on it until nearly up with Young's Point, which give a berth, and, passing Astor Point, run by the lead to the anchorage at Astoria.

Beating in.—Should the wind be well to the northward, and therefore scant for passing Clatsop Spit, tack the ship before the beacon is in range with Hall's Houses, and run over close to the Middle Sands, and tack again.

When up with the point of Clatsop Spit, Point Adams is in range with Ewing Peak (the high oval peak S.E. by E.)

The South Channel is a safe beating channel either in or out.

Sand Island, above alluded to, is a dry spot on the eastern extension of the Middle Bank. This bank is formed by the trees and timber which have floated down the river, and which become lodged here, forming a nucleus, around which the debris brought down by the stream increases. The island is about one-third of a mile long E.N.E. and W.N.W. by 250 yards in width. A large *beacon* on it, distinguishable outside the bar, and ranging with some houses, called Hall's Houses, on the eastern part of Baker's Bay, is (or was) the mark for clearing the West point of Clatsop Spit off Point Adams.

The Clatsop Channel, which passes in an easterly direction around Point Adams and the Clatsop Beach, is about half a mile wide between Clatsop Spit, which stretches off for $1\frac{1}{2}$ mile beyond Point Adams, having at its outer edge not more than $7\frac{1}{2}$ feet water. The channel is from 6 to 14 fathoms deep at the bend. Having rounded the inner red buoy off Clatsop

Spit, bear off to north-eastward to the lower or Sand Island anchorage in $7\frac{1}{2}$ fathoms, with the Sand Island beacon bearing West, about a mile distant. In leaving the river by the South entrance from the anchorage, keep Pillar Hill Tree shut in to the northward of Point Ellice (on the North side of the river), until Point Adams and Ewing Peak are in line, when keep off, gradually running down the channel near the line of breakers of the Middle Sand, until Point Adams comes on with Flat Hill North of the Pillar Hill Tree bearing about N.E. $\frac{1}{2}$ E., when bear out over the bar marked by the Fairway striped buoy.

The Clatsop Channel further up is bounded on the North side by the Middle Ground off Young's Bay. The West end of this Middle Ground is marked by a *black iron buoy*, lying in 5 fathoms, with Sand Island bearing W.N.W., and Point Adams S.W. $\frac{1}{2}$ S., one mile distant.

The southern side of this bank is marked by two more *black iron buoys*, and by a *black spar buoy*, marking the North side of the channel abreast Astoria. In beating up or down this part of the channel, bring the beacon on Sand Island and the Broom Tree on Cape Disappointment in one, and tack on the North side when in 7 fathoms, and on the South side in 6 fathoms. The tide sets fairly through the channel from Astoria to Sand Island.

At about 4 miles East by South of the land of Point Adams is *Point George* (or Young), forming the East limit of *Young's Bay*. It is the first point made after passing eastward of Clatsop Beach; immediately behind it the land is high and densely wooded. The entrance of *Young's River*, so named by Vancouver after Sir George Young, is about $1\frac{1}{2}$ miles E.S.E. of the point. From its banks a low meadow, interspersed with scattered trees and shrubs, extends to the more elevated land. From a sort of bar across its entrance it is not easily navigable, though the depth is above $2\frac{1}{2}$ fathoms.

Astor Point lies E. $\frac{3}{4}$ N. from Point Adams. It is low at the river bank; the southern channel passes close to it. The United States Coast Survey Station, about one quarter of a mile westward of the bay, is in lat. $46^{\circ} 11' 27.6''$ N., long. $123^{\circ} 49' 32''$ W.

ASTORIA, which lies to the eastward of Point George, on the southern shore of the river, has been much celebrated; but its fame depends mainly upon its historian, that delightful writer, Washington Irving, who has told all the world of its progress and fortunes. It has sunk from the scene of revelry and hospitality to a neglected collection of hovels. Though the site is still known by its original appellation, yet that was superseded for *Fort George*, when it was taken possession of by the British.*

* In 1809 Mr. John Jacob Astor, a German, who had emigrated from his native country in 1783, engaged in the fur trade, and in that year obtained a charter from the New York legislature for organising a Pacific Fur Company, all the capital of which belonged to him-

It now consists of two villages, Upper and Lower Astoria, the original station being the lower one. It has less than fifty houses, and a saw mill. At Upper Astoria, three-quarters of a mile to the eastward, is the United States custom-house, and a landing-pier. There is a large saw mill here, and a government military road leads to Salem, &c., on the Willamette.

Astoria is very beautifully situated. It is 11 miles from Cape Disappointment in a direct line. From it there is a fine view of that high promontory and the ocean bounding it on the West; the Chinook Hills and Point Ellice, with its rugged peak, on the North; Tongue Point and Katalamet Range on the East; and a high background, bristling with lofty pines, to the S. The ground rises from the river gradually to the top of a ridge, 500 feet in elevation.

The peninsula upon which Astoria stands forms a bay with Young's River, where the intrepid travellers, Lewis and Clark, wintered. The position of their huts (long since gone to decay) is still pointed out.

Eastward of Astoria is a remarkable projection from the southern shore, called *Tongue Point*, forming a peninsula; and to the North of this point is a channel, which has been designated the *Tongue Point Channel*. This leads over to the northern shore, and then turns to the eastward on the northern side.

Tongue Point is considered to be the best position for a fortification to defend the channel up the river. It is a high bluff of trap rock, covered with trees of large dimensions. There is a small portage on Tongue Point, which canoes often use in bad weather, to avoid accidents that might occur in the rough seas that make in the channel that passes round it.

The space, whose shores are thus imperfectly described, is from 3 to 7 miles wide, and very intricate to navigate, on account of the shoals which nearly occupy its whole extent. These shift very materially, and that, too, in very short periods of time, so that no established directions can here be given.

The *North Channel*, as before stated, is now not available for large vessels, but the following directions were issued by the United States Coast Survey in 1851. They may be useful, but it must be premised that they were drawn up before the light was established, and the changeable nature of the banks has been alluded to before.

To enter by the *North Channel*, bring Point Adams in range with Coxcomb Hill, and stand in until the beacon on Sand Island is in range with the second or inner peak of Point Ellice, when stand on towards Sand Island,

self. His plan was to establish posts on the coast of the Pacific, on the Columbia, &c., &c. For the execution of this project, two expeditions were sent out, one by sea and one by land. In September, 1810, the ship *Tonguin* left New York, and in March, 1811, founded the post of Astoria.

passing the South end of the North Breaker. When Cape Bluff and Leading-in Cliff come in range, haul up for the cape (quickly) on this range, which crosses Peacock Spit in $3\frac{1}{2}$ fathoms. On approaching Peacock Spit, drop a little to the eastward, and take the range of Cape Bluff and Snag or Green Point, which gives the best water between Peacock and Sulphur Spits, and leads all clear up to the bluff. Light draught vessels may keep on range of Cape Bluff and Leading-in Cliff till nearly up to Cape Bluff. Give the bluff a small berth, and keep on towards Baker's Bay until the second islet in the cove can be seen, when the vessel will be all clear of Sulphur Spit. This range clears the North side of the Middle Sands. Having passed Cape Bluff, anchor in $4\frac{1}{2}$ to 6 fathoms.

Ranges cannot be given for the channel from Baker's Bay to Sand Island, owing to the influence the current exerts at different stages of the tide. The cross tides in the North Channel, and the baffling wind near Cape Bluff, make this channel very difficult for sailing vessels.

The prevailing wind is N.W. by W., and in the narrowest part of the channel vessels must generally beat in a cross tide.

BAKER'S BAY is to the eastward of Cape Disappointment. It was named by Broughton. There is good anchorage in it under the cape. The bay runs $2\frac{1}{2}$ miles northward of the cape, and into its head some small streams run. Two or three houses and a saw mill a mile North of the cape are all that remains of the settlement designated as "Pacific City."

Chinook Point, the eastern limit of Baker's Bay, is N. by E. $2\frac{3}{4}$ miles from Point Adams. It is a low strip of land at the base of high wooded hills, one of which, called Scarborough Hill, is remarkable for being bare of trees. This eastern point is not good for anchoring, as a heavy sea sometimes sets in on it over the bar.

There are many fishing and Indian huts on Chinook Beach, occupied by salmon fishers. The fish commence running up about the end of May, and are remarkably plentiful by the end of June.

Point Ellis, or *Ellice*, is $2\frac{3}{4}$ miles nearly East, true, from Chinook Point. Behind it rise two peaked hills, one of which is (or was) used as a mark, with Point Adams as a leading mark for the southern bar.

THE COLUMBIA RIVER above this may be briefly described. From Cape Disappointment to the mouth of the *Cowlitz River* the course and distance are 46 miles in a straight line; along the course of the river it is 52 miles. The Cowlitz runs N.N.W. for 24 miles; thence N.E. to its head quarters in the cascades. It is navigated by canoes about 28 miles to the Cowlitz landing. At the Cowlitz landing, travellers take mules or horses through to Puget's Sound a trip of 52 miles.

From the Cowlitz the next course of the Columbia is S. 32° E. for 29 miles to the mouth of the Willamette River. The Willamette continues the same general course of the Columbia for 16 miles to the falls, where is

North Pacific.

*

situated the town of "Oregon City," destined to become a place of importance, on account of the extensive water-power, the river falling there perpendicularly 38 or 40 feet. Six miles lower down on the Willamette is the rapidly-improving town of Portland, situated at the head of ship navigation, with a population of nearly 5,000. The valley of the Willamette is well settled, and contains several thriving towns.

The snow peaks of the Volcanic Mount St. Helen's and Mount Hood lie exactly in line with the Cascades, the former N.W. $\frac{1}{4}$ N., 35 miles distant; the latter S.E. $\frac{1}{4}$ S., 28 miles distant. *Mount Hood* is an extinct volcano, covered with cellular lava, and, according to Dana, is between 15,000 and 16,000 feet high. According to other authorities, it is 18,316 feet.

On the lower part of the Columbia and Willamette many saw-mills have been erected since the gold discovery in California, and a large trade was carried on in lumber. Between San Francisco and Portland a very large and increasing general trade exists.

WASHINGTON TERRITORY.

The Columbia River divides Oregon from the Washington Territory, which extends between the parallels of 46° and 49° eastward to the Rocky Mountains.

SHOALWATER BAY.—The bold cliffs of Cape Disappointment, after extending about 3 miles northward, change suddenly to a low, broad, sandy beach, running N. by W. $\frac{1}{4}$ W. 18 miles, in nearly a straight line to the southern point of the entrance to Shoalwater Bay. A mile and a quarter behind this beach lies the southern arm of the bay. Its waters reach within a mile or two of the North side of the cape, and the portage from thence to the Wappalooche emptying into Baker's Bay, is said to be about a mile long, and always used by the Indians and settlers. The peninsula thus formed is covered with trees and a dense undergrowth of bushes. Within half a mile of its extremity it becomes very low and sandy, and has a covering of coarse grass, but no trees. This point was called *Low Point* by Meares in July, 1788. On the recent coast survey charts it is named *Leadbetter Point*. The Indian designation is Chik-lis-ilk.

CAPE SHOALWATER, or *Toko Point*.—From Leadbetter Point the North cape bears N.W. by N. $\frac{1}{4}$ N., $5\frac{1}{2}$ miles distant. Half a mile of the cape is low, sandy, and destitute of trees, but some tolerably high land, covered with wood, rises immediately behind it, being the only elevated ground between Cape Disappointment and Point Grenville that approaches the shore line. The isolated position of Cape Disappointment and the seaward face of its bold cliffs without trees form a peculiar feature. This with *Scarborough Hill*, partly bare, lying 5 or 6 miles East of it, the high mountains inland, and in clear weather the beautiful snow-peak of Mount St. Helen's, have no counterparts at Cape Shoalwater, and should remove all doubt in regard to the supposed general resemblance between them.

The **LIGHTHOUSE** at the North point of the entrance to Shoalwater Bay, sometimes called *Toke Point*, is a structure consisting of a keeper's dwelling, with a tower rising through it. Its height is $41\frac{1}{2}$ feet above the ground, and about 87 feet above the sea. It is about a mile from the extremity of the cape. The illuminating apparatus is of the fourth order of Fresnel, and shows a *fixed white light*, varied by *flashes* every $1\frac{1}{2}$ minute. It is visible 16 miles off, and is in lat. $46^{\circ} 44' 11''$ N., long. $124^{\circ} 2' 24''$ W.

The bay was surveyed in 1852 and 1855 by the U.S. survey party under Lieut. Jas. Alden, and it then had two entrances, separated by a middle ground, on which was an island, in a similar way to the entrance of the Columbia River. But in 1868 this arrangement was changed, the South channel had much filled up, and was said to be of no use, while the North channel had increased in depth to 5 fathoms, and was much wider and deeper, besides being broad and straight. The island had disappeared, and vessels sailed over its position.

As the bay is much frequented for oysters, transported to San Francisco, &c., it is of some importance, and is considered to be the best harbour on the coast North of San Francisco, being much more easy of access than the Columbia River.

The directions which follow are those issued by Lieut. Alden, but they must be taken with the qualifications above alluded to, and with all necessary caution if it is imperative that a vessel should enter without a pilot.

Four miles off the entrance to Shoalwater Bay a depth of 10 fathoms is found, and when well off shore a high double-peaked mountain shows to the eastward, well inland. The bar at the South channel has 4 fathoms of water upon it, in 1855 was a mile wide, and was 2 miles off the beach South of Leadbetter Point, with the northernmost trees bearing N.E. by E. Running in on this line, a vessel shoals her water from 10 fathoms 3 miles off shore, to 4 fathoms 2 miles off; then gradually deepens it to 5 fathoms, when she should haul close up under the point of breakers northward of her, and about half a mile distant; run along in from 6 to 7 fathoms, until abreast of the low grassy point, when the course of the channel will be N. by W. $\frac{1}{2}$ W. for $1\frac{1}{2}$ mile, with from 8 to 10 fathoms hard bottom, its outline being well marked by the breakers outside. From thence a course N.E. by N. for 2 miles will lead to 18 fathoms, and over a mile inside the line joining Leadbetter Point and Cape Shoalwater, the western trees on Leadbetter Point bearing S. $\frac{1}{2}$ E., $3\frac{1}{2}$ miles distant. If the tide is low, sand bars and flats will show on both hands, one directly ahead; the broad deep channel to the S.E. distinctly marked by bare patches on either side, and a narrow deep channel to the N.W. running into the North channel. From the last position the western trees on Leadbetter Point bear South, distant 4 miles. The current runs very strong through this channel. In summer, with a north-wester blowing, it is a dead beat after passing the bar, and in some

places the channel is less than half a mile wide between the 3-fathom lines. Coasters do not enter it except with a southerly wind, and always pick out the channel from aloft. In summer they have a leading wind out, and start on the first of the ebb.

The bar at the North channel has about $3\frac{1}{2}$ fathoms upon it, and bears S.W. by S. $\frac{1}{4}$ S., 3 miles from the southern extremity of Cape Shoalwater, or Toke Point. It is about a mile in extent within the 3-fathom line. In making the bay from the southward in summer, work to the northward of Cape Shoalwater, then run in and follow the shore outside of the breakers in 6 or 7 fathoms, gradually approaching them, and decreasing the depth to $4\frac{1}{2}$ and 4 fathoms, when the southern side of the elevated ground of the cape bears N.E. by N. $\frac{1}{4}$ N. Then head up as near that course as possible, crossing the bar in $3\frac{1}{2}$ fathoms, and continuing in that depth for at least a mile and a quarter, taking care not to decrease it on either hand. Keep under the breakers on the North side in from 5 to 7 fathoms, hard bottom, and increase the depth to 12 well inside the point, when its southern extremity should bear N.W. $\frac{1}{4}$ W., distant $1\frac{1}{2}$ mile. If it is low water, sand-banks will show in different directions, and the channels will be tolerably well marked.

The present invariable practice of vessels entering is to steer out the channel from the mast-head. In calm weather the channels must be known, or a pilot employed, if one is to be found.

The middle sands lie between the two channels. The southern tail is S.W. $1\frac{1}{2}$ mile from Leadbetter Point, runs N.W. by N. $\frac{1}{4}$ N. for $2\frac{1}{2}$ miles, then N.N.E. $2\frac{1}{2}$ miles, and E.N.E. $1\frac{1}{2}$ mile, with an average width of $1\frac{1}{2}$ mile. One mile outside of it soundings are found in 7 fathoms. This bay, as its name implies, is so full of shoals that at low tides about one-half of its area is laid bare. Good but narrow channels are found throughout its extent, but no direction can be given for running them. Without a knowledge of them, or without a pilot, follow them only at low water. The currents then run with great velocity, and it is very difficult and frequently impossible to keep a course against them. The arm stretching southward toward Baker's Bay is 15 miles long from Leadbetter Point, with an average width of not less than $3\frac{1}{2}$ miles, whilst the upper portion stretches to the N.E. for 9 miles to the North of the Whil-a-pah river, reckoning from the middle of the line joining Cape Shoalwater and Leadbetter Point.

The principal stream emptying into the bay is the Whil-a-pah, at its N.E. part. At about 9 miles from Cape Shoalwater it is less than a quarter of a mile wide, with low swampy banks, and steep bluffs on each side about a mile and a half apart.

The mouth of the *Palux* or *Copalux River* lies 5 miles N.E. $\frac{1}{4}$ E. from Leadbetter Point. It is half a mile wide at its mouth, and contracts very

much in 2 miles. The *Násal* enters about 11 miles South from the Palux, and abreast of the middle of Long Island. It has over 20 feet water at its mouth, with bluff banks for some distance, until it begins to expand, when it is bordered by flats.

Several streams open from the North side of the bay. One of these, the *Necomanche*, near the Whil-a-pah, has 6 feet in the main channel, and shows $1\frac{1}{2}$ mile wide at high tide.

There are three islands in the bay. *Pine Island*, about $1\frac{1}{2}$ mile N.W. by N. off the mouth of the Palux, is a small sand islet of only 4 or 5 acres in extent, and occupied by oystermen. It is near the channel and oyster beds, which stretch for a couple of miles to the N.N.E. of it. The Indian name of this island is Nass-too. The North end of *Long Island* is 8 miles from Leadbetter Point. This island runs irregularly about S.E. for 6 miles, and has an average width of $1\frac{1}{2}$ mile. It is covered with a dense forest of fir and undergrowth. One mile S.S.E. of Long Island is a very small islet called *Round Island*, of only a few acres in extent, covered with wood and bushes. The shores of the bay, except on the peninsula, are mostly composed of low perpendicular cliffs of a sandy clay, in which are strata of recent fossil shells and the remains of trees.

N.E. $\frac{3}{4}$ N., distant 6 miles from Leadbetter Point, is a sharp narrow cliff, 60 feet high, making out into the bay, which is wearing it away, and has exposed many large basaltic boulders. No other place on the bay presents this geological feature.*

The peninsula is a long flat marshy and sandy plain, elevated but a few feet above the level of the sea, and covered, like the entire surface of this country, with a dense growth of gigantic forest trees, principally spruce, fir, and cedar, with a few specimens of maple, ash, and black alder. The spruce frequently attains a diameter of 8 feet. The Indian name of the peninsula is Tee-choots.

It is asserted by settlers here that boats, canoes, &c., which have broken adrift and gone out of the bay, have in every instance been found on the beach North of the entrance, and generally between it and Gray's Harbour.

From Cape Shoalwater to Point Hanson, the southern side of the entrance to Gray's Harbour, the distance is $13\frac{1}{2}$ miles, and the hard ocean sand-

* The shoals are covered with shell-fish, amongst which the *oyster* is most abundant, and the principal article of export. They are small, and have a coppery taste. Codfish and halibut abound; sturgeon, said to be of good quality, are plentiful; and salmon, of several varieties and excellent flavour, exist in infinite numbers. In spring, vast shoals of small herring enter the bay. In winter, wild fowl are innumerable, but these have been made shy by the bad shooting of the Indians. Black and white swan, geese, mallards, canvas-backs, &c., always reward the experienced sportsman.

beach furnishes an excellent road that can be travelled at half tide by waggons.

GRAY'S HARBOUR.—The entrance to the bay is formed by Point Hanson on the South, and the southern point of Eld Island on the North. The northern end of this island is connected with the outer part of Point Brown at low water, but at high tide the beaches are one-quarter of a mile apart. The South end of the island lies N. 59° W., $1\frac{1}{2}$ mile from Point Hanson; its length is $1\frac{1}{2}$ mile, and direction N. 50° W., with a breadth of two to four hundred yards. Half way between Point Hanson and the island lies the N.E. end of a shoal or middle ground, bare at low water, and stretching S. 15° W. for $1\frac{1}{2}$ mile, with an average breadth of three-eighths of a mile. Between the N.E. end of this shoal and the South end of Eld Island passes the channel, with a width of less than five-eighths of a mile, and a depth of 16 fathoms. The channels were buoyed in 1867.

The peninsula terminated by Point Hanson is about three-quarters of a mile in breadth, and $3\frac{1}{2}$ miles long, and covered with fir to within half a mile of the point, which is a low sand-spit embracing a small marsh. The general direction of the peninsula is N.W., and inside of it lies South Bay, with a width of half a mile, affording the only safe anchorage near the entrance. More than half of this bay is occupied by mud flats. To secure the best position here, bring the northernmost trees on Pt. Hanson to bear S. 71° W., distant three-quarters of a mile, and anchor in the channel in $3\frac{1}{2}$ fathoms. This position places the vessel out of the influence of the South channel running to the Chehalis.

The anchorage under Point Brown is not only uncomfortable but unsafe to a vessel without heavy ground tackle. At this point there is no protection against the full sweep of the heavy summer winds, which, blowing at times counter to the strong currents in the bay, cause a very disagreeable short sea. Another circumstance tends to render this anchorage unsafe. Between Point Hanson and Eld Island lies the middle shoal, which, being bare at low water, confines the waters to a narrow regular channel; but when the tide rises sufficiently to cover this shoal the conflicting currents cause a heavy overfall, especially on the large tides, strong enough to tear a vessel from her anchors. The peninsula terminated by Point Brown is about a mile in breadth and $4\frac{1}{2}$ miles long; its general direction is S.E. by S. The bay shore is covered with fir. The outer shore is the commencement of a sand waste, stretching towards the Copalis River. Between the timber and this waste is a large pond or lagoon, and outside that the sand is covered with coarse beach grass, and stunted lupine bushes, and cut up with the tracks of bears, cougars, wolves, elk, &c. From the North end of Eld Island a body of water stretches into the sand waste parallel and near the ocean beach for about a mile. Close under the bay shore of this penin-

sula runs a narrow crooked channel, which Whidbey surveyed for 2 miles, and in which he gives 1 fathoms.

From Point Hanson the mouth of the *Chehalis River* bears N. 52° E., distant 12 miles, and this course is the general direction of the S.E. side of the bay, except the indentation forming South Bay. The first bluff inside the point is named *Stearns*, bearing N. 57° E., and distant 5½ miles. Around the south-west side of this bluff comes *John's River*. Within a mile and a half of the mouth of the Chehalis the Neuskah'l enters, coming from the south-east.

From Point Brown, Point New lies N. 39° E., distant 4½ miles, and having off it two rocks, now called Ned's Rocks. *Brackenridge Bluff* commences about three-quarters of a mile East of Point New, and extends three miles eastward to the low land bordering the *Hoquiamts River*. From Point New the shore-line runs nearly straight to the Chehalis, distant 8 miles, and the point of Stearn's Bluff lies S. 43° E., distant 4½ miles. To the N.N.W. of the line joining points New and Brown, lies *North Bay*, consisting of an immense mud-flat, bare at low water, and having an area of 22 square miles. At the head of it lies Saddle Hill. In the stretch of 4 miles N.W. of Point New are three small streams, called the *Typso*, *Chinois*, and *Humtology*, emptying into North Bay. They work narrow, crooked channels through the mud flats, but at low water there is not sufficient depth to carry a whale-boat through them.

By measurement, we find that more than nine-tenths of Gray's Harbour is bare at low water. Inside the entrance the area of the surface of the water, bounded by the flats bare at low tide, is only 4½ square miles. This will give a fair idea of the limited extent of the harbour. Through the flats lying between this available space and the Chehalis, run two contracted channels. The northern commences at a point 2 miles N. 67° E. from Point Brown, is the only available one, and would require buoys out for its entire length. For about 6 miles it is three-eighths of a mile wide, with a depth of 4 fathoms. The South channel commences just inside Point Hanson, and is very contracted and shallow. The flats are so extensive, and the mud so soft in places, that it is impossible to reach the shore except at high tides. This fact has retarded the development of the trade in lumber, although the shores are heavily timbered.

The trade of the bay amounts to carrying the supplies needed by a few settlers, and by the small military post on the Chehalis.

The *Chehalis River* has been navigated by a small steamboat for 20 miles, to the mouth of the *Latsop*, which comes from the northward. The country behind the bay appears low and flat, and well watered by the Chehalis and tributaries, which drain a section well timbered, and dotted with many small prairies and bottom lands.

Copalis River is little known. From Point Brown the shore-line trends

about N.N.W. for 10 miles to the mouth of the Copalis. The barren waste of Point Brown continues along this shore, commencing with a breadth of over 1 mile, stretching from the ocean to a dense forest of fir, and growing narrower as it approaches the Copalis, where the timber comes to the water's edge.

This stream is about 100 yards wide, but the mouth is almost closed by a bar. Upon its banks reside the Copalis tribe of Indians, from whom the river derives its name. Like all the streams on this coast, it abounds in salmon, but those caught here are celebrated for their richness of flavour.

From the Copalis to Point Grenville the shore runs N.W. $\frac{1}{2}$ N., about 16 miles, and continues low, nearly straight, and bordered by sand beach, which changes to shingle, disposed in long rows parallel to the coast. These ridges of shingle dam the mouths of many small streams and form ponds, abounding in trout, and well stocked with beaver and otter, according to the accounts of the Indians. The high land also approaches much nearer the beach, and forms sandstone cliffs, with rocky ledges projecting into the ocean.

POINT GRENVILLE is a bluff rocky promontory, stretching westward about a mile, and then southward about a quarter, forming a very contracted and exposed roadstead; with the 3-fathom curve extending half a mile from the beach, compelling vessels, except of very light draught, to anchor so far out, that the point and the rocks off it afford but little protection from the N.W. winds. It is useless during the winter months. The point has high hills lying behind it, and many rocks immediately off it. Two of these, about 75 feet high, lie E. by S., 400 yards distant; another lies S.W. $\frac{1}{2}$ S., half a mile distant. This, we believe, is the one that shows a large perforation through it, when viewed from the S.E. or N.W. It has 5 and 6 fathoms all round it. Others stretch along the coast to the N.W., one of them showing from the South as a leg-of-mutton sail. The bluff itself is composed of fine sandstone, is very steep, and may be ascended by a difficult trail, which is used by the Indians. It is said to be a great resort for sea otters, which are hunted by the natives.

North of Point Grenville to Cape Flattery the shore is bold and rocky, with occasional short reaches of sand-beach. The timber comes down to the water; moderately high hills approach the coast, through which empty numerous small streams, whilst the irregular Olympus range looms up far in the interior. In winter these mountains are covered with snow, which lies in the gorges and valleys nearly the whole summer. *Mount Olympus* is the highest peak of the range. It attains an elevation of 8,138 feet, according to determinations made in 1841; lat. $47^{\circ} 45' N.$, long. $122^{\circ} 37' W.$

Qué-ni-ull River.—The mouth of this small stream is between 3 and 4 miles N.W. by W. from Point Grenville, and is almost closed by the shingle and gravel thrown up by the surf. There is, however, a contracted

opening for the passage of canoes in calm weather. The closing of the entrance has so dammed the river as to form a small lake inside, upon the banks of which is situated a village of the Queniutls, a race of Indians hostile to all other tribes. Combined with others to the northward, they have ever been notorious for their hostility and vindictiveness to the whites. Several Spanish, English, and Russian vessels and their crews were in former times taken and destroyed. Hence we meet with the name Destruction Island, *Isla de Dolores*, Punta de Martires, &c., in this immediate vicinity. The river is said to rise in a lake at the foot of the mountains.

For 4 miles above the Queniutl the coast trends in the same direction, N.W. by W., is composed of sandstone cliffs, and bounded by many precipitous rocks, the height and direction of which are generally that of the cliff. In the coast survey reconnaissance of 1852 one is placed $2\frac{1}{2}$ miles off shore, in lat. $47^{\circ} 27'$, and the vessel's track is laid down inside of it. A great many large rocky islets lie close inshore in this vicinity, but northward the coast is nearly clear to Destruction Island. It makes a slight curve eastward, and alternates with bold yellow cliffs and low shores.

DESTRUCTION ISLAND.—This island is the only one found deserving the appellation after leaving the Farallones. It is about 150 high, quite flat on the top, covered with grass, but destitute of trees, and has high perpendicular sides of the same height as the cliffs on the main. It is said that there are some remarkable perforations through a rock near it, but these are doubtless only seen in particular directions, for in passing close to it we have never noticed them. On the eastern end were formerly some rude Indian huts. In Vancouver's time he found two or three dwarf trees at either end.

In running along the coast 10 miles off, it is very difficult to make out this island, because, being between $1\frac{1}{2}$ mile of the main, it is projected against the coast cliffs, and cannot be distinguished from them until close upon it. It is narrow, but about $1\frac{1}{2}$ mile long in a N.N.W. direction, running parallel with the coast, and has rocks for a mile off its southern end. A reef and sand-bank is represented as stretching thence W.N.W. 3 miles to broken water, and from there running nearly straight to the northern end. A detailed examination of this locality might prove that good refuge could be had under the island during heavy S.E. and S.W. weather. No winter harbour of refuge exists between Point Reyes and Neé-ah Bay, unless this be such, in which case it is of very great importance. This island is called *Isla de Dolores* upon old Spanish maps.*

* It received its present name, by which it is only known on the coast, in 1787, from Captain Berkely, who sent a long-boat from King George's Sound to explore as far South as lat. 47° . The crew of a smaller boat entered a shallow river, and rowed up some distance, where they were attacked and murdered by the Indians.

From Destruction Island northward the shore is composed of cliffs which form a regular curve to a point bearing N.W. $\frac{1}{2}$ W. from the North end of the island, and 11 miles distant; thence the shore runs nearly straight on that course for 10 to 2 miles, high, abrupt, and well-marked rocks standing a mile from shore. The outer one is bold, and covered with tall trees, but the inner one is bare. They are in lat. $47^{\circ} 58'$, long. $124^{\circ} 41'$. Many others, but smaller, lie inside of them, and 19 fathoms are found close outside. Along this stretch the shore is irregular and bluff, with many high rocky islets off it. A stream opens about midway in the stretch.

In the indentation northward of Destruction Island, and about 4 miles from it, empties a small stream called Hocch by the Indians.

FLATTERY ROCKS.—From the two rocks just mentioned to Cape Flattery in $48^{\circ} 23'$, the course is almost N.N.W., passing through a group of high, well-marked rocky islets, in lat. $48^{\circ} 12' N.$, named the Flattery Rocks. Before reaching these the coast-line curves about a mile eastward, with a bluff shore nearly free from rocks for about 8 miles, when a large white rock, half a mile out, looms up prominently, and is distinctly seen against the main land.

Flattery Rocks extend between 2 and 3 miles from shore; the outer ledge is awash, with one islet in it, and the track of the coast surveying steamer is laid down inside of it, with soundings in 9 to 20 fathoms. High, abrupt, timbered islets lie inside, with their ocean faces nearly perpendicular, about 150 feet high, and sloping landward. Where destitute of trees, these are covered with grass, bushes, &c. The latitude of the rocks is $48^{\circ} 12' N.$

From Flattery Rocks we find a high rocky coast, bordered by outlying rocks for 8 miles, when a low sand beach occurs, receiving a small stream which runs E.N.E. and finally North, behind the mountain constituting Cape Flattery, to within 200 yards of the beach in Neé-ah Bay. A rise of 20 or 30 feet of the sea would make Cape Flattery an island extending 5 miles (W.N.W.) by 3 miles in breadth. This creek is used by the outer coast Indians during the prevalence of heavy winter gales, when the passage outside the cape would be impracticable.

From Point Grenville to Cape Flattery the hills rising from the coast are about 2,000 ft. high, densely covered with trees, and cut up by innumerable valleys. The shore is inhabited by numerous tribes of Indians accustomed to war, and bitterly hostile to the whites. They are far superior to the Indians found along the southern coast. These villages are heavily stockaded, and the houses made of cedar boards, which they have cut with great industry from the tree. Their houses are very large, and partitioned off into stalls for each family. The numerous streams emptying upon the coast afford them a never-failing supply of the finest salmon; and to obtain means of barter with white traders, they fearlessly attack and capture the different species of whale on the coast.

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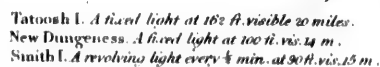
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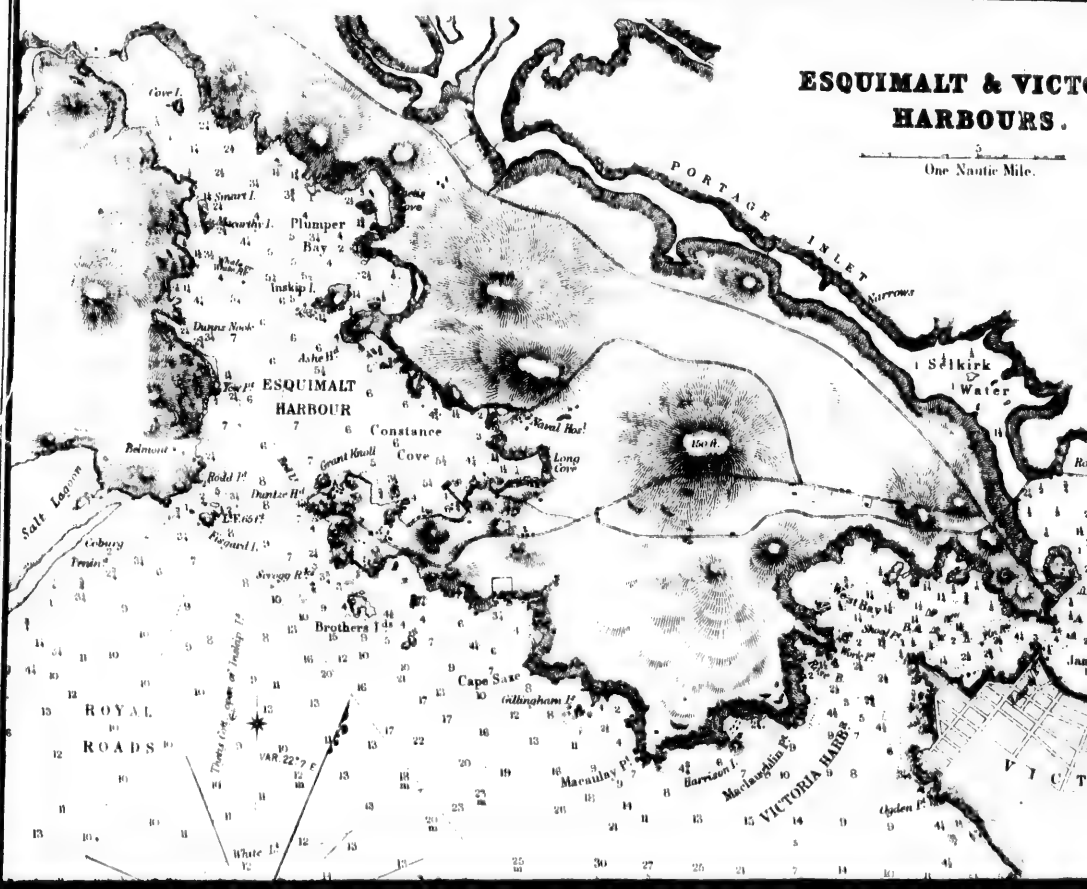
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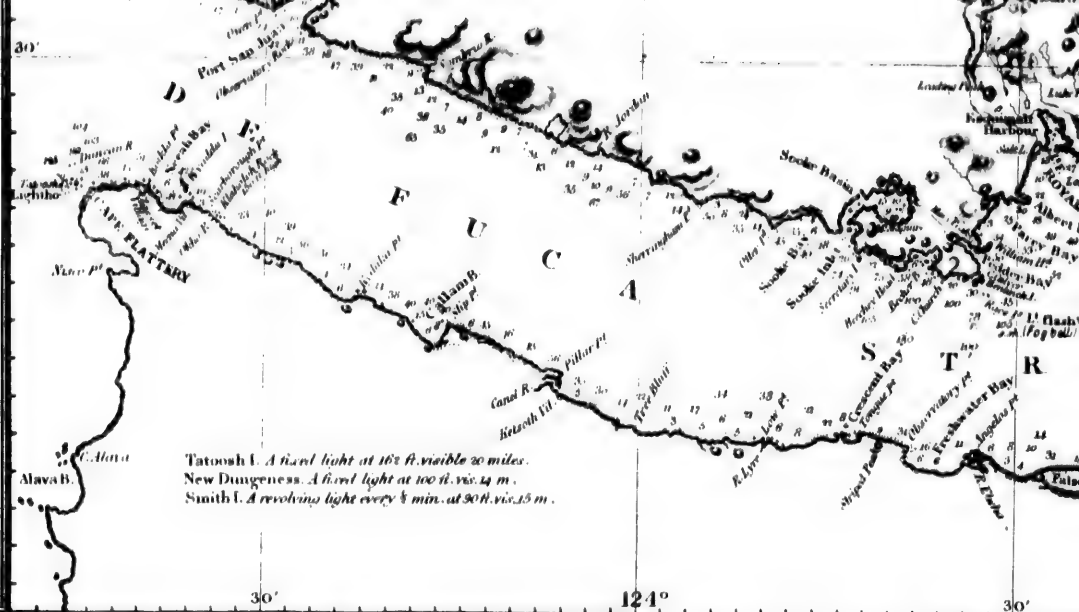
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ADMIRALTY INLET AND PUGET SOUND



One Nautic Mile.





THE STRAIT OF JUAN DE FUCA.

The discovery of this important strait was the subject of much controversy. It was attributed, in a narrative published in Purchas's Pilgrims, to a Greek pilot, known as Juan de Fuca, but whose real name was Apotolos Valerianos. He related that he found, in 1592, a channel here leading from the Pacific into the Atlantic, which was then named the Strait of Anian. Much doubt was thrown on this statement, and, by a singular fatality, its entrance was passed unperceived by Cook and others, so that these uncertainties seemed to be confirmed, and the strait was not re-discovered till Capt. Kendrick entered it in the American sloop *Washington* in 1789. It was well surveyed by Captain George Vancouver in 1792, and the very singular character of the inlets diverging from it to the S.E. were then first ascertained. The shores of the strait were surveyed by Captain (afterwards Admiral) H. Kellett, in the *Herald*, in 1847, and to the south-east of the strait, Vancouver's work was re-examined by Commodore Wilkes, U.S.N., but he found but little to correct. More complete surveys of some of the ports, &c., have been since made by the officers of the U.S. coast survey, since their occupation of the Washington territory, and it is to the last-named authorities that we owe most of the subsequent description of the South side of the channel, leaving that of the opposite shore of Vancouver's Island for the ensuing chapter. We have also derived some of the following from the accounts given by Captain G. H. Richards, R.N.

From its geographical position, the strait is liable to all those sudden vicissitudes of weather common to high northern latitudes; and in few parts of the world is the caution and vigilance of the navigator more called into action than in entering it.

The breadth of the strait between Cape Flattery, its southern point, and Bonilla Point, Vancouver Island, its northern, is 13 miles; within these points it soon narrows to 11 miles, and carries this breadth on an East course for 40 miles, or until Race Islands bear N.E. by E., distant, 10 miles; it then takes an E.N.E. direction for a further distance of 14 miles to the shore of the continent, or more properly Whidbey Island.

Between Race Islands and the southern shore the breadth of the strait is 8 miles, after which it immediately expands to 17 miles, leading northwards to the British possessions by various channels among the labyrinth of islands known as the Haro Archipelago, and southward to those of the United States, by Admiralty Inlet and Puget Sound.

The coasts of Fuca Strait are remarkably free from danger, and may be approached safely within half a mile. There is one breaking rock which

lies nearly that distance off the West point of Crescent Bay on the southern shore. The soundings in the centre are of great depth, but within $1\frac{1}{2}$ mile of either shore there is generally under 40 fathoms. On both sides of the strait there are several anchorages or stopping places which may be taken advantage of by vessels, either inward or outward bound when meeting with adverse winds.

On the northern or Vancouver Island shore of the strait the hills rise gradually, and are densely wooded, but near the coast attain to no great elevation; on the southern side the almost perpetually snow-clad mountains known as the Olympian range, rise more abruptly, and vary in elevation from 4,000 to more than 7,000 feet; but though exceedingly grand in their rugged outline, present no very marked summits as seen from the strait, nor any great variety in their features.

In the outer part of Juan de Fuca Strait there is no very great strength of tide; it varies from 1 to 4 knots, seldom so much as the latter, unless near Cape Flattery; but when approaching the more contracted part in the neighbourhood of the Race Islands, which receives the first rush of the pent-up waters of the Strait of Georgia, strengthened and diverted by the labyrinth of islands which choke up its southern entrance, it is not surprising that eddies, races, and irregularities occur which almost baffle any attempt at framing laws which may not rather embarrass than assist the seaman.

CAPE FLATTERY or **Classet** is a remarkable point of land, and distinctly seen at a distance of 35 miles, rising gradually from the sea to a thickly-wooded mountain nearly 2,000 feet high, with an irregular shaped summit, and falling again at the distance of 3 or 4 miles to the eastward. When seen from the southward or S.W. it has the appearance of an island, being separated by a stretch of low land from hills of the same or greater elevation, which rise again immediately southward of it.

On a nearer view, the headland itself, with its wild off-lying rocks, over which the sea is almost constantly breaking, presents no inviting appearance. It is a rugged sea-worn cliff, of no great elevation, and rising gradually to its more prominent feature, a densely wooded mountain. From the cape the coast trends E.N.E. for 4 miles to Neé-ah Bay, and though no positive dangers exist half-a-mile from the shore eastward of the cape, there is generally a heavy swell with irregular tides, and vessels are by no means recommended to approach it within a mile.

Tatouch or **Tatoosh Island**, lying W.N.W. half a mile from Cape Flattery, is a steep, almost perpendicular rocky islet, bare of trees, and 100 feet high, with some reefs extending a short distance off its western side. The lighthouse, known among seamen as Cape Flattery light, stands on the summit of the island, which, with its outlying reef, is the most western portion of the United States. A leaning rocky column, 75 feet high, and 25

feet diameter, is seen to the S.E. close under the cape. It is sometimes called De Fuca's Pillar or Pinnacle Rock.

The **LIGHTHOUSE** consists of a keeper's dwelling of stone, with a tower of brick, whitewashed, its height being 66 feet above the summit of the island. It shows a *fixed* white light of the first order, elevated 162 feet, and in clear weather should be seen from a distance of 18 miles, so that a vessel from the southward will make it before being up with the Flattery Rocks. Its position is in lat. $48^{\circ} 23' 15''$ N., and long. $124^{\circ} 43' 50''$ W.

Duncan Rock lies N.W. by N. a mile from Tatouch Island; it is a small low black rock, a few feet above water, but the sea always breaks over it. There is deep water between it and the island, but vessels are recommended not to take the passage unless compelled to do so.

Duntze Rock, with 3 fathoms water on it, lies about a quarter of a mile N.W. by N. from Duncan rock, and frequently breaks. Sailing vessels are recommended not to approach the lighthouse on Tatouch Island nearer than 3 miles. In the immediate neighbourhood of Cape Flattery, and among these rocks, the tides are strong and irregular.

NEEAH BAY is between Koikla Point and Wyadda Island; the latter half a mile long in a N.W. and S.E. direction, is narrow, and covered with pine trees. *Koikla* or *Koittlah Point*, is 4 miles E.N.E. from the lighthouse on Tatouch Island. The bay offers a safe and convenient anchorage to vessels meeting S.W. or S.E. gales at the entrance of the strait. The western shore is steep and cliffy; a reef extends for more than a cable off Koikla Point, and within the point a sand-bank, which dries, extends off a quarter of a mile at low water. The head of the bay is a low sandy beach, on which there is generally some surf rolling. On the eastern side of the bay off the S.W. side of the Wyadda (or Woaddah) Island, a rocky ledge and shoal water extend for 3 cables, and the holding ground is not so good on the island side.

A good berth will be found in Neeah Bay, in 6 fathoms sandy bottom, with the outer point of Wyadda Island N.E. by N., and Koikla Point W. by N. A short distance within this position kelp grows in large patches all over the bay, and some care is necessary in selecting a berth. Large sailing vessels may anchor in 7 or 8 fathoms a little outside the above bearings, in the centre of the bay, with the outer point of the island N.E. by E. It is high water in the bay at $12^h 33^m$; springs rise $7\frac{1}{2}$ feet; neaps, $4\frac{1}{2}$ feet.*

* Commander R. C. Mayne, R.N., who was engaged on the survey under Captain G. H. Richards, says in his interesting book that the Indians muster here in large numbers, owing to the quantity of cod, halibut, and other fish, on the bank running out from the shore of the island. The fishery will, no doubt, at some future time, prove a source of considerable profit to the colony.

A vessel should leave this bay on any indication of a N.E. wind, and if too late, and unable to weather Wyaddy Island, she may, with the assistance of the chart, run between it and the main.

The rugged coast to the eastward of Neeah Bay is quite unfit for settlement; although behind the rocks which line the shore lies much rich and fertile land, which, however, can only be reached from Admiralty Inlet and Puget Sound.

CALLAM BAY.—From Neeah to Callam Bay the distance is 15 miles. The intervening coast, which trends in an E. $\frac{1}{2}$ S. direction, is nearly straight, and the shore bold, the only remarkable feature being *Klaholoh* (*Seal Rock*), 150 feet high, which lies a short distance off the shore, 2 miles eastward of Wyadda Island. It is easily recognized by *Slip Point*, its eastern bluff, which is the western termination of a bold coast ridge, about 1,000 feet in elevation.*

The Coast from Callam Bay continues in the same direction for 8 miles to *Pillar Point*, so called from its terminating in a bare columnar-shaped rock, a little remarkable, where, from the character of the country, generally thickly wooded from summit to water-line, few objects present themselves by which vessels may accurately fix their positions. The coast on the East side of this point forms a small bight, in which there is a considerable stream and an Indian village, and then trends E. by N., with a gentle curve to *Striped Peak*; a small river, the *Lyre*, emptying itself just eastward of a low point 7 miles westward of the peak.

Striped Peak is rather remarkable from a landslip occurring down its face, and from which it received its name. It is several hundred ft. high, but the landslip is rapidly becoming obliterated by vegetation. At $1\frac{1}{2}$ mile westward of the peak, and a third of a mile off the West point of Crescent Bay, which is merely an indentation, lies a rock, which breaks at low water; this is the only danger which occurs on the southern side of the strait. Westward of this, some kelp grows a short distance from the beach on the somewhat sheltered part between *Striped Peak* and *Pillar Point*, and here the depth of water at a mile from the shore varies from 8 to 16 fathoms; westward of *Pillar Point* it deepens to 40 fathoms at that distance.

FRESHWATER BAY, at 3 miles eastward of *Striped Peak*, between *Observatory* and *Angelos* points, is a nearly a mile deep, and more than 2 miles wide in an East and West direction. The two entrance points are E. by N. and W. by S. of each other, and within this line the depth varies from 6 to 12 fathoms. *Observatory Point* has several rocks lying a short distance off it; the western side of the bay is a high bold shore. *Angelos*

* About halfway along the face of this ridge is a vein of lignite, a coal not fit for steamship use, but it contained 68 per cent. of carbon. The face of this ridge has deep water, but the bottom is very irregular.

Point, the eastern entrance point, is low; the river *Elwha* emptying itself through it, forms a delta. Vessels may anchor within the line of the points in from 6 to 9 fathoms.

PORT ANGELOS or False Dungeness is 7 miles eastward of the East point of Freshwater Bay, the intervening coast forming rather a deep indentation to the southward, off which as little as 3 fathoms water is found nearly a mile from the shore. The North side of the port is bounded by one of those low narrow sand or shingle spits which are a characteristic feature of the country. This spit, which is named *Ediz Hook*, curves from a high bluff in an E.N.E. direction for nearly 3 miles, and forms a large and good harbour. On the North or spit side the water is deep, varying from 15 to 30 fathoms; but southward of a line drawn through the centre there is excellent anchorage in from 7 to 10 fathoms in any part of the port. The outer part of the spit is steep-to, and may be rounded close-to, after which the port extends for $2\frac{1}{2}$ miles in a westerly direction, by more than a mile in breadth. Although open to easterly winds, they do not blow home. A large spar beacon painted *white* has recently been erected on Ediz Hook, which is a good guide to the entrance during daytime. *Fresh water* is to be obtained from streams on the South side of the port.

The spit is so low that at times the sea washes over it, and as it is impossible to see it at any distance, vessels would be apt at night to run on it if passing close to the southern shore of the strait. Dungeness light, therefore, should not be brought to bear to the northward of E. by N. $\frac{1}{2}$ N., which will lead more than 2 miles off, but as the spit is nearly 13 miles from the light, the latter would not in all states of the weather be visible; and at night vessels should not go within the depth of 14 fathoms.

NEW DUNGENESS BAY.—The shore from False Dungeness gradually curves to the N.E., and about 8 or 9 miles from Ediz Hook, another long, low, narrow sand-spit, covered with grass, stretches from the bluff shore in a general N.N.E. direction for $3\frac{1}{4}$ miles, forming the north-western side of the roadstead of New Dungeness. A shoal with $2\frac{1}{2}$ fathoms extends N.N.E. for half a mile from the end of the point, and a heavy tide-rip runs over it at the change of the currents. On the inside, 1 mile from the eastern extremity, another narrow sand-spit stretches $1\frac{1}{2}$ mile southward towards the main shore, forming a large inner shoal bay with a narrow opening, through which the water passes as over a rapid; at low tide, abreast this point, is a small stream, on the western side of which is a bluff 60 feet high, and upon it is a large village of the Clallams. The shore eastward of the stream is low, swampy, and covered with trees and brush; it forms the southern or main shore of the roadstead, and off it are extensive mud-flats, which are bare at low water for five-eighths of a mile, and run as far as Washington or Budds harbour; shoal water exists for some distance outside these flats. About 20 fathoms are found a quarter of a mile South of the light-

house point, the depth regularly decreasing across the bay with a soft tenacious muddy bottom.

Fresh water may be obtained in abundance at the above stream, but boats must obtain their supply at low tide, and come out when the tide has sufficiently risen.

LIGHT.—At about a sixth of a mile within the outer end of the point is a structure consisting of a keeper's dwelling, of stone, with a tower of brick; the upper half being a dark lead colour, the lower half white. The tower is 92 feet high, and its elevation above the sea 100 feet. It exhibits a *fixed* white light of the third order, which should be seen from a distance of 15 miles. Lat. $48^{\circ} 10' 59''$ N., long. $123^{\circ} 6' 7''$ W.

A *fog bell*, of 1,100 pounds weight, has been placed upon the outer extremity of the lighthouse point at New Dungeness, and it will be sounded every *ten seconds* during foggy or thick weather day or night.

The usual and best anchorage in New Dungeness Bay, is to bring the lighthouse to bear about N. by E. $\frac{1}{4}$ E. half a mile distant, where 10 fathoms are found a third of a mile off the beach. With the lighthouse bearing N.W. by N. three-quarters of a mile distant, the same depth and bottom are found, the nearest shore will bear South $1\frac{1}{4}$ mile, and the mud flat three-quarters of a mile in the same direction; from this position a vessel can readily get under weigh and clear the point.

It is high water, full and change, at New Dungeness, at 3^h, and the rise is 5 feet.

The Coast from New Dungeness trends to the S.S.E. for nearly 7 miles, and forms a deep indentation, in the western corner of which is Washington (or Budds) harbour, and in the eastern Port Discovery. The entrance of the former is almost closed by a long sand-spit extending from the eastern side, leaving a narrow channel with only 2 fathoms water, which deepens within to 13 fathoms.

PORT DISCOVERY, the harbour where Vancouver anchored and refitted his ships, and from whence he commenced his exploration of these regions in May, 1792, is an extensive inlet running in a southerly and south-east direction for 6 miles, with an average breadth of $1\frac{1}{4}$ mile; the general depth of water is from 20 to 30 fathoms, but an anchorage may be had on the West side $1\frac{1}{4}$ mile within the entrance in 15 fathoms, close to the shore. At the head of the port there are 10 fathoms, but a mud flat extends for a mile from the shore.

Protection Island lies immediately off the entrance of the port, and shelters it from N.W. winds. The North side of the island is shoal for half a mile off, and there is a 3-fathom patch bearing N.W. 2 miles from its North point; reefs extend also off the East and West points for half a mile, but there is a clear deep channel in on either side. A spit extends a short distance off Clallum Point, the western point of entrance.

ADMIRALTY INLET.—At 14 miles E.N.E. from New Dungeness light, is the entrance to Admiralty Inlet, between Wilson Point on the West and Partridge Point on the East, the latter a remarkable sloping cliff of a whitish colour; and here commences that extensive and singular series of inland navigation, which penetrates the continent in a general southerly direction for nearly 90 miles.

LIGHT.—On Admiralty Head, which forms the inner eastern entrance point of the inlet, and bears N.E. by E. $3\frac{1}{2}$ miles from Wilson Point, is a *fixed* white light of the fourth order, elevated 119 feet above the mean level of the sea, and visible in clear weather at a distance of 17 miles. This light is of the greatest benefit to the numerous vessels entering Port Townshend and the inlet.

PORT TOWNSHEND lies at the threshold of Admiralty Inlet, and is the port of entry for Washington Territory. Vessels leaving Fuca Strait have frequently, when overtaken by a westerly gale, been compelled to bear up and seek shelter in it. Although a safe harbour, from its great extent it is subject to a disagreeable sea during strong winds.

The entrance is between Wilson and Marrowstone Points, the latter bearing from the former E.S.E. $3\frac{1}{2}$ miles. At $1\frac{1}{2}$ mile inside Wilson Point, and on the same side is Hudson Point, the distance between which and Marrowstone Point is also $1\frac{1}{2}$ mile; and between these two points is more properly the true entrance of the port, which now runs in a S.S.W. direction for 2 miles, and then S.E. for about the same distance, the average breadth being nearly 2 miles; the general depth of water is from 9 to 15 fathoms good holding ground, soft mud when within Hudson Point. Wilson Point is low, with sand hillocks on its extreme; a shoal spit extends for nearly half a mile off it. Hudson Point should be rounded within half a mile or less.

At half a mile within Hudson Point there is good anchorage in the western side of the port, off the houses, in 10 fathoms, half a mile from the shore.

The town of Port Townshend has increased very much since the discovery of gold on Fraser River. No fresh water (1862) is to be had, but vessels can obtain a small supply near the military post. Some fine farms lie near the town, and vegetables are plentiful at reasonable prices. The place was noted for the rough character of its "beach combers."

A military post has been established on the bluff, $2\frac{1}{2}$ miles S. by W. from the town, and on a site which commands one of the most beautiful views in these waters, having the bluff and varied shores of the bay on either hand.

Marrowstone Point is a low sandy point stretching 300 yards eastward from the base of the bluff, and forming an indentation on its southern face, *North Pacific.*

where anchorage may be had in 12 fathoms, with a current or eddy invariably running ebb.

ADMIRALTY HEAD.—Abreast of the entrance to Port Townshend, is a perpendicular cliff 80 feet high, falling on the eastern side to a low, pebbly shore, which runs 2 miles to the E.N.E., and strikes the high cliffs on the eastern side of the inlet.

The Lighthouse on Admiralty Head consists of a keeper's dwelling, with a white tower rising to a height of 41 feet, and the elevation of the light is 119 feet. The light is *fixed*, and visible about 17 miles. Its geographical position is, lat. $48^{\circ} 9' 22''$, long. $122^{\circ} 40' 8''$.

ADMIRALTY INLET is a collection of very singular and labyrinthine channels, terminating at Puget Sound and its various branches, which reach the lat. of $47^{\circ} 2'$. Some portions of their shores are remarkably fertile and beautiful, and it would seem to be almost the only eligible part for colonization in the Washington Territory. The settlements formed by its original settlers, emanated from the Hudson's Bay Company.

The whole of these inlets were accurately and amply explored and surveyed, for the first time by Vancouver, in May, 1792, and most of the names were applied by him. Hood's Canal was thus named after Lord Hood. The American Exploring Expedition, under Captain Wilkes, also surveyed the assemblage of inland waters, adding the names not given by Vancouver, chiefly those of the officers of the expedition.

The shores of all these inlets and bays are remarkably bold; so much so, that in many places a ship's side would strike the shore before the keel would touch the ground.

Starting from abreast Marrowstone Point the mid-channel course up Admiralty Inlet runs S.E. by S. $\frac{1}{4}$ S. for 7 miles. The shores on either hand are bluffs of apparently uniform height, covered with trees. After running thus about 5 miles there will be passed, on the eastern shore, a low point, with one or two clumps of trees and bushes, to which has been given the name *Bush Point*. On the western shore is a rounding bluff point 1 mile North of the point which forms the N.E. part of Oak Bay; off this point is good anchorage in 12 or 15 fathoms. The high bold headland, several miles directly ahead, is *Foulweather Bluff*, and that to the E.S.E. destitute of trees, except one large clump, which marks it conspicuously from this direction, is *Double Bluff*. The deep indentation between it and Bush Point, with low land in the rear, is *Mutiny Bay*. At the end of the course *Oak Bay* opens to the westward, and stretches towards the waters of Port Townshend. It has bluff shores nearly all around it. The depth of water is 5 to 15 fathoms. The length of the bay is 3 miles, and its average width about $1\frac{1}{2}$ mile.

The opening West of Foulweather Bluff is Hood's Canal; vessels bound into it keep close to the western shore of the bluff, and pass two low points

lying near together. The next or third course up the inlet is E.S.E. for 10 miles, passing on the eastward Double Bluff, which stretches north-eastward for a mile, and rises 300 or 400 feet, having its top covered with wood. The bluff running also to the northward forms *Useless Bay*. This has deep water over the greater portion of it, with a large shallow bay called *Deer Lagoon* at its head. The high bluff forming the southern point of Useless Bay is Satchet Head. A similar bluff lies 2 miles E. by S. of it. These form the southern extremity of Whidbey Island, in lat. $47^{\circ} 54'$, and are the turning points into Possession Sound.

Foulweather Bluff.—On the western side of the last mid-channel course is Foulweather Bluff (already noticed), which is perpendicular on its N.N.W. face, and about 225 feet high, with heavy firs upon its summit. It slopes towards the East to a bluff 40 feet high, but is steep on the side next to Hood's Canal. The low point, 4 miles eastward of it, is *No Point*, making well out, and destitute of trees or bushes; thence the western shore runs nearly straight S.E. by S. for 10 miles.

At the end of the last course the inlet expands to a width of 7 miles. The next, or fourth mid-channel course up the inlet is S.S.E. for 21 miles to Allen Bank, which lies a mile off the North end of Vashon Island. Five miles on this course, or 7 from No Point, brings us to an excellent little harbour on the western side of the inlet, called *Apple-tree Cove*, having a low point on the North side, with a soft mud-flat extending several hundred yards up the inlet. There is no fresh water in the vicinity, but very good timber may be procured suitable for boat-spars, and booms.

The inlet is here only 3 miles wide, and continues so to Point Jefferson, 2 miles southward of Apple-tree Cove. This is a moderately low, straight bluff, with the ground rising behind it, and covered with timber. Stretching broad off its eastern face for three-quarters of a mile is a 9-fathom shoal, which affords capital anchorage for vessels when drifting with light airs and adverse currents.

PORTS MADISON and Orchard.—*Point Jefferson* is the northern side of the entrance to this port, which runs 3 miles W.S.W., with an average width of 2 miles, and a large depth of water, except under Point Jefferson, where anchorage may be had in 10 and 15 fathoms, hard sandy bottom, with patches of kelp inshore.

The S.E. point of the entrance is low and sandy, making out from high wooded ground. One mile West of it is the narrow entrance to a natural canal, upon which, in full view, are situated the Port Madison saw-mills. At the S.W. part of the bay is the very narrow entrance to Port Orchard. The channel is somewhat crooked, but it has 3 and 4 fathoms water in it. On the western side of this entrance are some white patches of beach, formed by clam shells. Both sides of the entrance are bluffs. Vessels not well acquainted with the channel must enter under easy sail, and keep a lead

ADMIRALTY INLET.

going on each side of the vessel to ascertain where the deepest water lies. After getting through give the point, 1 mile off on the western side, a berth of nearly half a mile, to avoid a shoal which makes out East from it.

Bainbridge Island lies between Port Orchard, Port Madison, and Admiralty Inlet. It is 8 or 9 miles long by $2\frac{1}{2}$ in breadth, and its general direction is S.E. by S. A few loggers' huts stand on the western side, and the Madison saw-mill at the North end. On the S.E. part it is indented by two small harbours.

Duwamish Bay.—Abreast of Port Madison the eastern shore of the inlet retreats, and there receives several small streams of water, but it gradually makes out into a very long low sand-point, called *West Point*, which forms the extreme N.W. part of the entrance to Duwamish Bay. The bay runs E. by S. $6\frac{1}{2}$ miles, and has a width of 2 miles. To the South point, called *Battery Point*, which is low and bare, with a curiously shaped mound rising sharply behind it, the course is about S.E. by S., and distant $4\frac{1}{2}$ miles. Through the centre of the bay the depth ranges from 88 to 40 fathoms. On the North side of Battery Point a vessel anchoring in 20 fathoms cannot have a greater scope of chain than 35 fathoms without being too close to the shore. On this side of Battery Point is the deserted town of Alki (the Indian phrase for "by-and-by"). The town has had several names, but there is nothing about it to command trade.

The town of *Seattle* is on a small point at the N.E. part of the bay, a little over 5 miles inside of West point. It consists of a few houses and stores, a church, and a small saw-mill; and a number of university buildings are to be erected (1862). It has but little trade. Seattle has been proposed as the terminus of the northern trans-continental railroad, penetrating the Cascade Mountains by the Yakima Pass, and thereby making the line 140 miles shorter than by the Columbia River pass, which is remarkably favourable, whilst the former is only possibly practicable.

The usual anchorage is directly off the wharf in 10 to 15 fathoms water, with the large white house on the extreme point bearing about East, or E. by S., and at a distance from the beach of about 500 yards.

RESTORATION POINT.—From the S.E. point of Port Madison to this point the shore is bluff and somewhat irregular, and is indented first by Eagle harbour, having a long pebbly spit making out 300 or 400 yards S.E. from its North point; and next, at Point Restoration, by *Blakely Harbour*, having off its entrance a large rock, 15 feet high, with deep water all round it. Blakely Harbour is only a quarter of a mile wide and three-quarters long, with 18 fathoms sticky bottom at its mouth. *Eagle Harbour* is larger and more commodious than Blakely.

The geographical position of the triangulation station of the Coast Survey upon this point is, lat. $47^{\circ} 35' 6''$, long. $122^{\circ} 28' 15''$. From this point Battery Point bears E. by N. $\frac{1}{2}$ N., distant $2\frac{1}{2}$ miles.

The approximate establishment at Restoration Point is $4^h 4^m$. The mean rise and fall of tides is 7.4 feet.

South of Restoration Point, Admiralty Inlet opens westward for a couple of miles into a bay, in which is situated an island about three-quarters of a mile in extent, called *Blake Island*. From the N.W. part of the bay a narrow crooked pass, 3 miles long, leads to the southern part of Port Orchard, which spreads out into several arms. The pass is obstructed by rocks, and is difficult of navigation.

Our last course brought us to *Allen Bank*, off the North end of Vashon Island, with Blake Island to the westward, and three-quarters of a mile distant. This bank is nearly a mile in extent, and has as little as 10 fathoms upon it, with a variable bottom, in some places mud, and in others hard sand. The N.E. point of Vashon Island is Dolphin Point; the N.W. point, Point Vashon; the point abreast of it is Point Southworth; and the mile-wide channel, commencing between the last two points, is *Colvos Passage*, running West of Vashon Island.

The main body of Admiralty Inlet continues about S.E. for 8 miles, then S.S.W. 8 miles further, with an average width of 2 miles. In this stretch the currents are moderately strong, the chances for anchoring few, and it is sometimes calm while a fine breeze is blowing through Colvos passage.

Brace Point lies on the East side of the inlet, N.E. from Dolphin Point. The round-topped point having two or three lone fir-trees upon it, and situated on the same side of the inlet, 4 miles above Brace Point, is called *Point Pully*; the water is very deep close to it on either side.

Colvos Passage is the usual, we may say the invariably used ship-channel towards Puget Sound. It is about a mile wide, with high bluff shores, varied by numerous small, low sand-points making out from the face of the bluff, and having deep water off them. The passage is 11 miles long to the South end of Vashon Island, called *Dalco Point*, and it runs with a nearly straight course S. by E. At $1\frac{1}{2}$ mile inside of Point Vashon there is a small curve in the shore-line called Fern Cove, with excellent anchorage in 5 and 10 fathoms. Abreast of Dalco Point on the western shore there is a small harbour, with a narrow and shoal entrance, called *Gig Harbour*. Looking out of the passage to the North, Mount Baker shows distinctly in clear weather.

COMMENCEMENT BAY.—When abreast of Dalco Point this bay, at the termination of Admiralty Inlet, opens to the E.S.E., and over its low background shows the high snow-covered peak of Mount Rainier. The general direction of the bay is E. by S. $\frac{1}{2}$ S., with a length of 3 or 4 miles, a width of 2 miles, and a great depth of water up to the line of the extensive flat at its head, which is backed by marsh.

Vashon Island, lying between the southern extremity of Admiralty Inlet and Colvos Passage, is $11\frac{1}{2}$ miles long, with an average width of $2\frac{1}{2}$ miles.

Halfway down on its eastern side lies a curiously shaped peninsula, formed by a narrow, low sandy neck of land, which makes out into the inlet, and then runs towards the South point of the island. The space between this peninsula and the island is an excellent harbour, 4 or 5 miles long, and three-quarters of a mile wide, having a depth of 5 to 10 fathoms water in it.

The island is high, with steep shores, covered with wood and undergrowth. Its surface is marshy in many parts that are quite elevated. The harbour formed by it and the peninsula is known as *Quartermaster Harbour*.

Point Defiance and the Narrows.—The high, sharp yellow bluff facing the South entrance to Colvos Passage is called *Point Defiance*, and between it and the western shore pass all the waters of Puget Sound. This passage is named the *Narrows*. Its average width is three-quarters of a mile, and very uniform; the shores are high, bold, and in some places rocky. For 2 miles to the S.E. its course is a regular curve. The next turn is to the southward, and at a distance of 2 miles in that direction the waters of the sound open ahead, with a narrow pass between the main and Fox Island to the West.

PUGET SOUND is a most singular termination to Admiralty Inlet. The fertility of its shores, and its fine climate, may possibly make it of considerable importance in future years. It received the name of Mr. Puget, the officer under Vancouver's expedition, who originally surveyed it.

Puget Sound may be described as a collection of inlets, covering an area of 15 miles square, the only entrance to which is through the Narrows, which, if strongly fortified, would bid defiance to any attack, and guard its entrance against any force.

The inlets, in the order in which they come from the entrance, have received the names of *Carr's*, *Case's*, *Hammersley's*, *Totten's*, *Eld's*, *Budd's*, and *Henderson's*, from the officers of the United States' Exploring Expedition; they are united by passages, which form several islands and peninsulas. All these inlets are safe, commodious, and capacious harbours, well supplied with water, and the land around them fertile. On many of the islands and peninsulas are to be found slate and sandstone, which, though soft and friable in some places where it has been exposed on the surface, will be found suitable for building purposes.

The aggregate shore-line of this sound, and the adjacent part of Admiralty Inlet, with Colvos Passage, to the North end of Vashon Island, is not less than 370 miles. Upon its shores are situated the settlements of Steilacoom, Nisqually, Olympia, and Newmarket.

Steilacoom.—On the eastern shore of Puget Sound, 9 miles South of point Defiance, is situated the town or village of Steilacoom, upon a rising bluff. It consists of only a few houses. Fort Steilacoom stands about a mile in-

land, upon a piece of gravelly prairie, and roads lead from it to the town and the creek.

The usual anchorage is off the small wharf, in 15 fathoms, hard bottom, and about 400 or 500 yards from the shore. An island lying $2\frac{1}{2}$ miles westward of that position is called McNeil, and between it and Fox (Rosario) Island, to the northward, there is a passage $1\frac{1}{2}$ mile wide. The passage on the South side of McNeil Island, between it and Anderson Island, is generally known as Balch Passage. It bears about S.W. by W. from the anchorage, and is marked by a small wooded islet in it, called Eagle Island, off which lies rocky bottom, and vessels keep closer to the North shore. This passage is the direct channel to Olympia, instead of following the broad one southward of Steilacoom.

When approaching Steilacoom, or bound direct for Olympia, a patch of kelp, with foul bottom and less than 3 fathoms of water upon it, must be avoided. It bears S.S.E. 1 mile from the South end of Fox Island, and N.W. by W. $1\frac{1}{2}$ mile from Steilacoom Wharf. The tide-rip upon it and abreast of the town is very great; quite sufficient, with a little wind, to swamp a small boat. The shores of the main and islands are bold, nearly uniform in height, and covered with trees.

The corrected establishment of the port is $4^h 46^m$. Spring tides rise 11.1 feet, and neap tides 7.2 feet.

Nisqually, 5 miles South of Steilacoom, and on the same side of the sound, is at present a place of no trade or importance. It was one of the early posts of the Hudson Bay Company, and is still occupied by them. An extensive mud-flat exists off the mouth of the wide, marshy valley, but the depth of water is very great close to it, and the anchorage room very much contracted. The river Nisqually empties here, and there are two small saw-mills upon it.

Olympia.—It would be almost useless to attempt to describe the route to Olympia from Steilacoom, as a pilot or a good chart is absolutely necessary in making the passage. The mid-channel course is 21 miles in length, and its width from half to $1\frac{1}{2}$ mile.

Olympia is situated at the head of Budd Inlet, which is 6 miles long and three-quarters of a mile wide, and runs nearly South. The shores are steep and wooded, and the head of the bay an immense mud-flat, behind which is the town. It acquires prospective importance by being the capital of the territory, but especially on account of its proximity to the Columbia River valley, and to the headwaters of the Chehalis. Vessels are brought up to the wharf at the highest tides, and then rest in the mud until ready to leave.

The greatest difference between the highest and lowest tides is reported to be about 24 feet, and is doubtless more than this when we compare its

position with that of Steilacoom. The approximate corrected establishment is 5^h 8^m.

The approximate geographical position of the wharf is, lat. 47° 3', long. 122° 55'.

HOOD'S CANAL.—The entrance to this arm of Admiralty Inlet lies between Basalt Point and Foulweather Bluff, the latter bearing E. $\frac{1}{2}$ S., distant 3 $\frac{1}{4}$ miles from the former. The first mid-channel course is S.E. for 4 miles, pointing directly into Port Gamble, at the entrance to which the houses and mill are plainly visible; and passing a high, round, wooded peninsula on the West side of the channel, and connected to the main by a narrow neck of low sand beach. This is frequently mistaken for an island, and is called Hood's Head. Between this head and Port Gamble the canal changes its course, and runs in nearly a straight line S. by W. 40 miles, with an average width of 1 $\frac{1}{4}$ mile. In lat. 47° 21' N. it makes an abrupt turn, and runs for 12 or 13 miles about N.E.

Port Ludlow.—Close to Basalt Point lie some rocks, with others about half a mile S.E., called the *Colvos Rocks*, among which is one 25 feet high, but of small extent. Close inshore, and abreast of this, is a rock just *awash* at high tide, but between the two runs a channel with 15 fathoms water, having soft muddy bottom. The bright bluff head, 1 $\frac{1}{4}$ mile S.E. of the *Colvos Rocks*, and about 2 miles S.W. by W. from Foulweather Bluff, is *Tala Point*. Halfway between the *Colvos Rocks* and this point is the usual entrance, over a sand-bar having 4 $\frac{1}{2}$ fathoms.

Of all the small harbours in these waters this has the preference, as it is completely land-locked, and protected from gales from every quarter by the high land and high trees around it. The first steamboat built in these waters was launched here in 1860.

Port Gamble. After passing Foulweather Bluff, keep closer to the eastern shore than to the west, to avoid the strong current passing round the low point which makes out from Hood's Head. Run for the saw-mill, plainly in sight, on the western side of the entrance to the bay, and when within a mile of it approach the eastern bluff within one-third of a mile, in about 10 or 15 fathoms, gradually drawing closer inshore, and passing between the outer white and inner black can buoys. At the lowest tides the white one is in 15 feet, the black in 12 $\frac{1}{2}$, and the small spar buoy between them in mid-channel in 17 feet, but it rarely shows above water at any tide. After passing these buoys the mill bears almost S.S.E. half a mile distant. Steer S.E. or halfway between the mill-wharf and the East point, pass to the East of the white spar buoy, which is in 12 $\frac{1}{4}$ feet, and run through the entrance, passing the wharf at about one-third of the distance between the points. Do not round up to the eastward, as a shoal makes out almost parallel with the point. It may be here noticed that these buoys were made and placed by the Puget Mill Company, for the benefit of vessels trading to the port.

If the wind be ahead while beating up, it will be impossible for a large vessel to get in, as the channel is half a mile long, and not over 100 yards wide at the narrowest part. Anchor off the buoy, and drop in with the early flood, or warp in with the last of the ebb. On the shoal forming the western side of the passage 10 feet may be found until up with the white spar buoy.

At about 3 miles from Hood's Head, on the western side of the canal, is *Suquamish Harbour*. A large sand-bank occupies its centre, and extends a mile in length N.N.W., by half a mile in width. The approaches to the shoal, which is in part bare, are detected in thick weather by the lead, the soundings decreasing regularly from 20 fathoms. Keep, however, close under the northern shore, which runs 2 miles W.S.W. from the low point called Termination Point.

At 14 miles from Hood's Head the canal curves more to the southward, and then to the S.S.W. around Hazel Point, on the West side of which a large arm of the canal makes North for 10 miles, bifurcating near its head. On its western side the eastern spurs of the Olympus range reach its waters, and form the western shore-line of the canal to the great bend. The sharp peak named *Mount Constance* attains an elevation of 7,777 feet.

At 2 miles South of Hazel Point, and on the eastern side of the canal, is a fine harbour, formerly called *Hahainish Harbour*, but the name has been changed by settlers, who have lately built a small saw-mill there. It is formed by Seabock Island on the West, and is about a mile long by half a mile wide, with good bottom in from 10 to 15 fathoms.

POSSESSION SOUND may be considered as the southern entrance to the channel, separating Whidbey Island from the main land. Its eastern shore is compact, forming a deep bay, into which the *Sinahomis River* falls. Seven miles within the entrance from the South is a high round island. It was observed by Vancouver that the tide or current constantly set outwards here.

At 2 miles N.W. from this round island is *Point Alan*, the South extremity of *Caamano Island*, which lies between Whidbey Island and the main. Point Alan is the end of a high, narrow strip of land, which separates Port Susan on the East from Port Gardner on the West of Caamano Island. *Port Susan* extends about 11 miles north-westward, and is terminated by a line of kelp fronting a tract of swampy land, through which a rivulet extends which forms the island to the West. The land farther back is more elevated, and covered with a growth of timber similar to that in other parts. It was in the upper part of this inlet that Vancouver's ship, the *Chatham*, ran aground, but was soon got off.

Eastward of Alan Point, on the main land, is a small bay, before which Vancouver anchored. There were two excellent streams flowing into it, but

they were so nearly on a level with the sea, that it became necessary to procure the water at low tide, or at some distance up the brook, which latter was easily effected, as the boats were admitted to where the fresh water fell from the elevated land. They also took some fish with the seine.

Port Gardner (so named by Vancouver after Vice-Admiral Sir Alan Gardner) is the western arm of the continuation of Possession Sound, its western shore being formed by Whidbey Island. This shore was found by Vancouver to be well peopled by Indians, who were very friendly. At about 14 miles from Point Alan the branch which runs thus far about N.N.W. assumes the directions of about W. and N.E.

Penn's Cove is the termination of the western branch, and is a very commodious and excellent harbour, with regular soundings from 10 to 20 fathoms, good holding ground. Its western extent, in lat. $48^{\circ} 14'$ (according to the United States' Survey) is not more than a league from the eastern shore of the main inlet within the strait. On each point of the harbour Vancouver found a deserted village, in one of which were several sepulchres, formed exactly like a sentry-box.

The main channel to the N.E. leads to a branch whose general direction is N.W. From the eastern shore of this branch a shallow flat of sand, on which are some rocky islets and rocks, runs out until within half a mile of the western shore, forming a narrow channel, navigable for about 3 leagues. The depth in its entrance is about 20 fathoms, but gradually decreases to 4 fathoms in advancing northward, and the sand-bank, continuing with great regularity, makes it about half a mile wide to lat. $48^{\circ} 24'$, where it ceases to be navigable for vessels of any burden, in consequence of the rocks and overfalls, from 3 to 20 fathoms deep, and a very irregular and disagreeable tide.

In the bay just to westward of the South entrance point of Possession Sound, that is, of Whidbey Island, there is a shoal lying a little distance from the shore; it shows itself above water, and is discoverable by the soundings gradually decreasing to 10, 7, and 5 fathoms, and cannot be considered as any material impediment to the navigation of the bay.

WHIDBEY ISLAND is well fitted for settlement and cultivation. The soil is good, the timber excellent, and there are several open plains, which have been prepared by nature for the plough. It is about 33 miles in length of irregular figure and breadth.

Admiralty Head, with its Lighthouse, have been before described.

The West coast of Whidbey Island continues in an irregular N.W. direction to *Partridge Point*, which forms the N.E. point of the entrance of Admiralty Inlet. It is formed by a high, white sandy cliff, having one

of the verdant lawns on either side of it. According to the survey by the United States' Exploring Expedition, it is in lat. $48^{\circ} 12' 30''$ N., long. $122^{\circ} 45'$ W.

"Passing at the distance of about a mile from this point, we very suddenly came on a small space of 10 fathoms water, but immediately again increased our depth to 20 and 30 fathoms. After advancing a few miles along the eastern shore of the gulf, we found no effect from either the ebb or flood tide."

Smith, *Blunt*, or *Bonilla Island*, lies $6\frac{1}{2}$ miles N.W. of Partridge Point, and 5 from the nearest land. It is low and sandy, forming at its W. end a low cliff, above which some dwarf trees are produced. Some rocks lie on its western side, nearly three-quarters of a mile of its shores, and its eastern part is formed by a very narrow low spit of land, over which the tide nearly flows. From this the remarkably lofty and snowy peak of Mount Baker bears N. 63° E., and that of Mount Rainier S. 27° E. Two other very lofty round snowy mountains are also seen to the southward of these. They appear to be covered with perpetual snow, as low down as they can be seen, and seem as if they rise from an extensive plain of low country.

The *Lighthouse* on its western summit, showing a revolving light every half minute, is alluded to hereafter.

Deception Passage, which runs into Port Gardner, to the North of Whidbey Island, is a very narrow and intricate channel, which, for a considerable distance, is not 40 yards in width, and abounds with rocks above and beneath the surface of the water. These impediments, in addition to the great rapidity and irregularity of the tide, render the passage navigable only for boats or steam-vessels of small burden, and well acquainted.

To the northward of this the Strait of Juan de Fuca is limited by a collection of islands which separates it from that explored by Vancouver, and named by him the Gulf of Georgia. The North side of Deception Passage has proved to be in reality an island by the United States' Exploring Expedition, and named *Fidalgo Island*, separated from the main land on the East by a tract of low land, intersected by a narrow stream. The country here assumes a very different aspect from that seen to the southward. The shores are here composed of steep rugged rocks, whose surface varies exceedingly as to height, and exhibits little more than the barren rock, which in some places produces some herbage of a dull colour, with some few dwarf trees.

Rosario Strait forms the connection between the Strait of De Fuca and the Gulf of Georgia, running northward between Fidalgo Island and that next westward, named *Lopez Island*. It will be described more particularly hereafter. Off the S.E. point of Lopez Island, which is the entrance of this

strait, and which is low and rocky, there is a very dangerous sunken rock visible only at low tide; and $2\frac{1}{2}$ miles to the northward is a very unsafe cluster of small rocks, some constantly and others visible only near low water. The strait varies from 5 to 3 miles in width. On its eastern side, that is, against Fidalgo Island, are *Alan* and *Burrows's Islands*, off the South end of which are some detached rocks.

Cypress Island lies in front of the opening, some 7 miles within it. It is 4 miles in length, and on its western side is *Strawberry Bay*, so named by Vancouver from the great quantity of very excellent strawberries found there when Mr. Broughton first visited it.

This bay is situated on the West side of the island, which, producing an abundance of upright cypress, obtained the name of *Cypress Island*. The bay is of small extent, and not very deep. When at anchor in 16 fathoms, fine sandy bottom, its South point bears S.E. $\frac{1}{2}$ S., a small islet forming nearly the North point of the bay, round which is a clear good passage West; and the bottom of the bay East, at the distance of about three-quarters of a mile. This situation, though very commodious in respect to the shore, is greatly exposed to the winds and sea in a S.S.E. direction. In fair weather wood and water may be easily procured.

Rock Islet is a small round islet covered with trees, lying nearly 2 cables northward of the North end of *Cypress Island*. There is a passage of 9 fathoms between it and *Cypress Island*. *Cypress Reef*, lying W. $\frac{1}{2}$ S. from *Rock Islet*, is a *dangerous* rocky patch with kelp growing about it, covering at half flood.

Sinclair Island, thickly wooded, and comparatively low, lies to the north-eastward of *Cypress Island*, with a deep passage, of nearly a mile in breadth between them, leading to Bellingham Channel. An extensive and dangerous shoal, the *Panama Reef*, extends nearly half a mile in a W.N.W. direction off its N.W. extreme, some parts of it uncovering at half-tide; a large boulder stands on the inner part of the reef.

Guemes Island lies to the eastward of *Cypress Island* and North of Fidalgo Island, and to the eastward of these the main land forms Padilla Bay.

Bellingham Bay is separated from Padilla Bay to the South by a long, narrow peninsula, of which William Point is the West extreme. There are a number of channels leading into it through the cluster of islands before alluded to; and the bay itself extends about 12 miles North and South. It everywhere affords good and secure anchorage. Opposite to its North point of entrance the shores are high and rocky, with some detached rocks lying off it. Here is a brook of most excellent water. To the North and South of these rocky cliffs the shores are less elevated, especially to the northward, where some beautiful verdant lawns are seen. The land generally is incon-

venient for communicating with, on account of a shallow flat of sand or mud which extends a considerable distance off the land.

In the Spanish survey this bay appears in two portions, the northernmost being named *Gaston Bay*. This part is separated from the gulf by a long, narrow peninsula, terminating in Point Francis; an inlet lying in the middle of the bay is called *Puerto del Socorro*, and the southern part of the bay is called *Padilla Bay*, an appellation confined in the recent charts to that still farther South. Coal, or rather lignite, has been found and worked in the sandstone beds in Bellingham Bay.

Lummi Island, off the N.W. point of Bellingham Bay, is 8 miles long, and very narrow. On its south-western side it is high and precipitous, a remarkable double mountain rising about 1,400 feet abruptly from the sea. There are no dangers off its western side.

Whitehorn Point is a remarkable bold bluff, about 150 feet high, its face showing as a steep white clay cliff. It is the southern point of Birch Bay, and is 9 miles N.W. of the North point of Lummi Island, and N.E. by N. distant 10 miles from the entrance of the Strait of Georgia, between East Point and Patos Island.

Birch Bay is between Whitehorn Point and South Bluff; the latter, which is a moderately high rounding point, forms the North entrance point of the bay. Some large boulder stones stand a short distance off it, and should not be rounded at a less distance than half a mile. The bay runs in a N.E. direction for more than 2 miles.

The holding ground is good, and with S.E. gales it affords excellent shelter. A good berth is with Whitehorn Point bearing South, distant a mile, in 4 fathoms.

Semiahmoo or Boundary Bay is an extensive sheet of water between the promontory of Roberts Point on the West, and South Bluff on the East, which bear West by South and East by North of each other, and are distant 8 miles. The bay extends in a northerly direction for nearly 7 miles, and is only separated from the South bank of Fraser River by a low delta 3 miles across, intersected by streams and swamps. All its upper part is shallow, and dries off for 3 miles at low water.

Vessels should never stand so far to the northward as to bring the white bluff of Roberts Point to bear to the southward of S.W. by W., which line of bearing leads more than half a mile outside the shoal edge of the bank; the general depth of water outside this line is from 7 to 15 fathoms good holding ground.

The boundary between the Washington Territory and British Columbia is marked on the shore, and also along the parallel of 49° by iron beacons or pillars set up by Capt. Richards, in July, 1861.

JUAN DE FUCA STRAIT.

Drayton Harbour, at $3\frac{1}{4}$ miles N. by E. of South Bluff, is formed by a remarkable low narrow spit, over a mile long, which is the termination of the bluff itself. The Spit is covered with grass and drift timber, and a few pine trees grow on it. Several wooden buildings were erected on it in 1858, and received the name of Semiahmoo city.

There are 5 fathoms water in the entrance, but the channel is narrow, and no vessel unacquainted with the locality can enter unless by placing boats or poles on the edges of the shoals.

The northern shore of Juan de Fuca Strait will be described in the next Chapter.

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CHAPTER VI.

VANCOUVER ISLAND, ETC.

PRIOR to 1789 the outer coast of this island was supposed to be that of the American continent, but in that year its insular character was established.

The first intimation in Europe of the existence of the channel which separates Vancouver Island from the continent was in the observations prefixed by Captain Meares to the Narrative of his Voyages. In the chart accompanying that work there is a sketch of the track of the American sloop *Washington*, in the autumn of 1789, which is that through the inland navigation presently described. The name of the commander is not given; but it was naturally supposed that Captain Gray, of the *Columbia*, previously mentioned, was the person. In the angry discussion which ensued between Meares and Dixon relative to the remarks of the former, it is stated that Mr. Kendrick was the commander of the *Washington*, who perhaps took it after it had been quitted by Gray. Therefore Kendrick,* in the sloop *Washington*, must be taken as the person who really made known the real character of the territory in question, after the formerly discredited voyage of its discoverer, De Fuca, in 1592.

Vancouver reached the coast in March, 1792, and after navigating through the strait to the eastward, he applied the names Quadra and Vancouver Island to it; the first name in compliment to the Spanish commandant at Nootka Sound, from whom he received much politeness during the negotiations relative to the restoration of the tract of country claimed by Great Britain, as mentioned hereafter. Lately, however, the first name has been dropped, and that of the surveyor only retained for it, which is certainly

* Kendrick never returned to Europe. He was killed in 1793, in Karakakooa Bay, by a ball accidentally fired from a British vessel while saluting him.

preferable, as the Spanish governor took no part in its geographical advancement.

It remained in the same state, untenanted by Europeans during many subsequent years, until later events gave it a new existence. It was only visited, at regular intervals, on its north-eastern side, by the officers and agents of the Hudson's Bay Company for the trade in furs and other commodities collected by the natives, and at Nootka Sound, on its S.W. side, for refreshments, &c., by the vessels in the North Pacific.

When, however, the treaty which severed the Oregon and Washington Territories from Great Britain, and the thriving settlements established therein by the Hudson's Bay Company became surrounded by a foreign power and interest, Vancouver Island assumed a fresh importance to English commerce.

The British crown granted the dominion of Vancouver Island to the Hudson's Bay Company by letters patent under the great seal, and dated Jan. 13th, 1849, which gave the absolute lordship and proprietorship of the whole island, with its mines, &c., to the Hudson's Bay Company, at the yearly rent of seven shillings.

In the course of time several difficulties and questions arose between the British Government and the Hudson's Bay Company, relative chiefly to the lands occupied by the latter prior to 1849, and it was deemed advisable that the government should regain the possession of the island, reserving to the Company and those to whom they had disposed of the land all previous rights, and thus, by mutual agreement, it reverted to the Crown on February 3rd, 1862. In 1861 the upset price of country land was fixed at 4s. 2d. per acre, a measure which gave great satisfaction in the colony.

The prosperity of the island did not advance as was anticipated, and the superior attractions of the gold-fields of British Columbia no doubt tended to add to the depression felt, especially in 1866. A further anomaly existed in the different policy maintained in these two adjacent young colonies, and, after much strong feeling on both sides, the two colonies were united, or rather Vancouver Island was attached to British Columbia by Act of Parliament, 1866, a measure proclaimed in Victoria, its capital, on Nov. 19th in that year. The question of the future capital of the united colonies was then mooted, and the decision was arrived at that New Westminster, proclaimed the capital of British Columbia February 14, 1859, must give way to the superior advances and general commercial interest which belonged to Victoria. This town was proclaimed as the capital on May 25, 1868.

In the subsequent description we commence with the Haro Archipelago, which lies to the S.E. of Vancouver Island, between it and the Washington Territory of the United States. This congeries of islands and channels, so little known and so little valued at the time, has been the subject of very

serious controversy and complication between the two nations, the United States and Great Britain, threatening at one time to involve them in a war. At the time of the treaty which separated Oregon from Great Britain, the charts showed only two channels, the eastern one, that of Rosario, being the only one used, and the other marked on the old Spanish maps as the Canal de Haro, but almost unknown and quite unused.

The vague wording of the treaty of 1844 said that "the channel" should be the separation between the two territories, meaning, as is maintained, the Canal de Rosario. But the United States Government, as soon as the country became valuable, insisted that the Haro Channel was "the Channel," and thus claiming the Island of San Juan as included in their territory. This island is the only one worth having for colonization, as it commands all the channels leading to the country of British Columbia, as well as the harbour of Victoria, from which it is distant only 5 or 6 miles. In order to adjust these rival claims, Capt. G. H. Richards, R.N., the present chief hydrographer, arrived here in Nov., 1859, in H.M.S. *Plumper*, for the purpose of making a detailed survey, and fixing the boundary on the parallel of 49° N. The results of this exhaustive examination showed that, instead of one or two channels, there are *three* principal passages through the archipelago, and with very numerous ramifications from each. As the matters stand, the western channel is claimed by the United States, the eastern channel by Great Britain, and, as a compromise, the middle channel has been proposed as a boundary. In the mean time the Island of San Juan has been occupied by two small bodies of troops, 100 of each nation, till the matter is finally adjusted. It would be out of place here to pursue the political question. This is very ably handled by Lord Milton, in his work,* which will give a full insight into the whole subject, elucidated as it is by the noble author's intimate personal acquaintance with the region and the topics relating to it.

THE HARO ARCHIPELAGO.

The **HARO ARCHIPELAGO** lies in the space separating Vancouver Island from the continent, the distance between them being about 20 miles, and the islands covering a space of about 400 square miles in area. There are three more important islands, San Juan, the westernmost and best, Orcas, the northernmost and largest, and Lopez the easternmost. There are about thirty minor islands and innumerable rocks, mere masses of trap rock covered with pines.

The subsequent description taken, with some abridgements, from the *Vancouver Island Pilot*, drawn up by Captain G. H. Richards in 1864, commences with the south-easternmost portion, as following in geographical order the previous descriptions.

* History of the San Juan Water Boundary Question, by Viscount Milton, M.P., London, January, 1870.

ROSARIO STRAIT.

ROSARIO STRAIT is the easternmost and one of the principal channels leading from the strait of Fuca into that of Georgia. Its southern entrance lies between Lopez and Fidalgo Islands, before described, and from thence its general direction is from N.N.W. to N.W. for 25 miles, when it enters the latter strait.

Like Haro Strait, the Rosario has several smaller channels which branch off to the eastward, and lead between islands to the United States settlements in Bellingham Bay, or by a more circuitous route into the Strait of Georgia itself. It varies in breadth of the strait from 5 miles; the narrowest to something less than $1\frac{1}{2}$ mile; the depth varies from 25 to 45 fathoms, occasionally deeper.

The tides are strong, from 3 to 7 knots in the narrower parts. The principal dangers are the Bird and Belle Rocks, which lie almost in the centre of the strait, 4 miles within the southern entrance. There are several anchorages available for vessels delayed by the tides or other causes. The ebb tide here, as in the narrower straits, runs from 2 to $2\frac{1}{2}$ hours after low water.

Light.—On the summit of Smith or Blunt Island, near the West end, is a lighthouse painted white, with a red lantern, which shows at an elevation of 90 feet above the sea a white light, which *revolves every half minute*, and is visible at 15 miles.

Having made Smith Island, which vessels bound from sea up Rosario Channel should do on about a N.E. $\frac{1}{4}$ E. bearing, it may be passed on either side. When Dungeness light bears S. by W. keep it so, steering N. by E., which leads midway between Smith Island and an extensive kelp patch lying W. $\frac{1}{4}$ S. $8\frac{1}{2}$ miles from it, on which the least water yet found is $3\frac{1}{2}$ fathoms. When to the northward of the patch, a course may be steered for the entrance of the strait, which, however, should not be entered at night. If passing to the southward of Smith Island, avoid two kelp patches of 5 fathoms least water nearly 3 miles S.S.E. from the light, and 4 miles W. by N. from Partridge Point, a remarkable white face cliff on the main. Vessels from the southern parts of Vancouver Island, bound up Rosario Strait, should of course pass northward of Smith Island.

CAPE COLVILLE, the south-eastern extreme of Lopez Island, is the western entrance point of Rosario Strait. *Walmouth Hill*, flat-topped, and about 500 feet high, rises immediately over it. Colville Island, small, and bare of trees, about 40 feet high, lies southward of the cape, distant half a mile. Entering the strait, Colville Island should be given a berth of a mile.

Davidson Rock, with 2 feet on it at low water, and occasionally uncovering at low springs, lies East a little more than 3 cables from the East end of

Colville Island, and South nearly a mile from the cape itself. Kelp grows about the rock, but the patch is so small that it is difficult to make out.

Kellett Island is a small flat-topped islet, covered with grass, and lying immediately northward, and close off the low extreme of Cape Colville. *Cape St. Mary*, the next point northward of Cape Colville, and a little more than a mile from it, forms the southern point of Davis Bay. *Hulah Rocks*, or *Kellett Ledge*, with one fathom water on them, and marked by kelp, lie 3 cables N.E. by N. of Cape St. Mary. There is a deep passage between them and the cape. Vessels passing outside them should give the cape a berth of a long half mile.

Davis Bay affords good and convenient anchorage in a moderate depth of water. After rounding the Hulah Rocks, a vessel may stand to the westward into the bay, and anchor in 6 fathoms mud, little more than half a mile from the shore. A kelp patch, on which there is shoal water, lies N. by W. a mile from the cape. There is anchorage in from 4 to 8 fathoms anywhere within a mile of the East shore of Lopez and Decatur Islands.

Bird Rock, lying almost in the centre of Rosario Strait, is composed of three detached rocks close together, the southernmost being the largest, and 20 feet above high water. From Cape Colville it bears N. $\frac{1}{4}$ E. nearly 4 miles, and from the South end of James Island, S.E. by S. $1\frac{1}{2}$ mile. There is deep water close to it, but on account of the strength of the tides, sailing vessels working up or down, particularly during light winds, are recommended to give it a berth of half a mile.

Belle Rock is the most serious danger in the Rosario Strait, because it only uncovers near low water, and the tides run over it from 2 to 5 knots. It lies N. by E. $\frac{3}{4}$ E. distant 6 cables from the Bird Rock, and the passage between the two rocks carries from 8 to 20 fathoms, but vessels are recommended not to take it except in cases of necessity, on account of the tides. The Belle Rock is easily avoided by day. The great danger of the Belle Rock to a sailing vessel is being left with a light wind in the centre of the strait, as the water is too deep with much prospect of an anchor holding in so strong a tideway.

James Island, almost divided in the centre, is a remarkable saddle island, with two summits, lying close off the East side of Decatur Island. There are no dangers on its off or eastern side.

White and Black Rocks are three-quarters of a mile apart, and lie off the S.E. shore of Blakely Island. White Rock, the southernmost, is 6 or 8 feet above high water, and a little more than a quarter of a mile from the shore at the eastern entrance of Thatcher Passage (page 283). Black Rock, just awash at high springs, lies N.E. by N. from White Rock, and half a mile from Blakely Island. There is a deep channel between these rocks, as also between them and Blakely Island.

The Peapods are two small rocky islets, bare of trees, lying half a mile

from the western shore of Rosario Strait, and $1\frac{1}{2}$ mile southward of Lawrence Point, the East extreme of Orcas Island. They are three-quarters of a mile apart in a N.N.E. and S.S.W. direction, the northernmost being the largest and highest. A little to the westward of a line drawn between them is a third rock which just covers at high water. There are no dangers about them which are not visible.

ORCAS ISLAND is the most extensive of the group known as the Haro Archipelago, and contains the finest harbours. It is mountainous and in most parts thickly wooded, although in the valleys there is a considerable portion of land available for agricultural purposes, and partially clear of timber. Its southern side is singularly indented by deep sounds, which in some places almost divide the island. This is particularly the case in the East Sound, separated only from the waters of the Strait of Georgia by a low neck of land a mile across. On the eastern side of this sound, *Mount Constitution* rises to an elevation of nearly 2,500 feet, wooded to its summit.

The eastern side of Orcas Island, between the Peapod Ialets and Obstruction Pass, falls back in a bight, where there is considerably less tide than in the main stream of the strait, and if necessary a vessel may drop her anchor within half a mile of the shore in about 16 fathoms.

Lawrence Point, the eastern extreme of Orcas, is a long sloping point, the termination of the ridge of *Mount Constitution*. Immediately on its North side it rises abruptly in high, almost perpendicular cliffs, and trends to the westward, falling back for 3 miles in a somewhat deep bight, which is rocky, has deep water, and is unsheltered.

Rosario Strait now lies between Orcas and Lummi Islands, the direct channel being along the western shore of the latter in a N.W. $\frac{1}{2}$ W. direction. Anchorage may be had, if necessary, within a mile of the shore in 15 fathoms, between Sandy and Whitehorn Points, northward of Lummi Island. This last island has been before described.

Tides.—After passing northward of Lawrence Point, the ebb tide will be found to set to the eastward between Orcas and the small islands to the northward of it, as well as to the S.E. through the northern entrance of the strait. When as high as Alden Bank, or about 8 miles above Lawrence Point, the strength of the tides sensibly decreases, and while a vessel is eastward of a line between this bank and Roberts Point, she will be entirely out of the strong tides of the Archipelago and the Strait of Georgia. It is recommended with the ebb tide to work up on this shore.

Clark and Barnes Islands are two small wooded islands, 2 miles N.W. of Lawrence Point. Two smaller islets, *The Sisters*, bare of trees, and a high rock lie immediately S.E. of Clark Island. There is a passage $1\frac{1}{2}$ mile in breadth between these islands and Orcas with a depth of 45 fathoms.

THE MIDDLE CHANNEL.

277

The tides set strong about the Sisters, and the best and most direct channel is between Clark and Lummi Island.

Matia Island, 3 miles W.N.W. from Clark Island, and a mile eastward of Sucia Island (which is 2 miles off the North side of Orcas Island), is a mile in length, East and West, moderately high and wooded. Close off its East point is *Puffin Islet*, and extending a short distance eastward of the islet is a flat covering rock. Vessels bound through Rosario Strait are recommended to pass eastward of Matia.

ALDEN BANK, 2 miles in extent North and South, and one mile East and West, lies in the centre of the northern entrance of Rosario Strait. Its southern limit is 2 miles North of Matia Island, and there is a channel 3 miles in breadth between it and the eastern shore.

The depth of water on this bank varies from 3 to 7 fathoms, and in one spot so little as 14 feet is found; the bottom is in some parts rocky, with patches of kelp growing on it; in other parts it is sandy, and offers a convenient anchorage for vessels becalmed or waiting for tide.

Vessels passing up or down are recommended to pass on the eastern side of the bank.

THE MIDDLE CHANNEL.

The **MIDDLE CHANNEL** is the centre of the three passages leading from the Strait of Juan de Fuca into that of Georgia, and is bounded by San Juan Island on the West, and the islands of Lopez, Shaw, and Orcas on the East. Although a deep navigable ship channel, and eligible for steamers of the largest size, the southern entrance is somewhat confined, and subject to strong tides, with a general absence of steady winds; the wide straits of Rosario and Haro, on either side of it, are therefore far to be preferred for sailing vessels above the size of coasters.

The general direction of the channel is N.N.W. for 5 miles, when it trends to the W.N.W. for 7 miles to its junction with Douglas Channel. The southern entrance lies between the S.E. point of San Juan and the S.W. point of Lopez Island. In entering, the danger to be avoided on the western side is the Salmon Bank, extending southerly from San Juan; and on the eastern the Whale Rocks, always out of water. The tides in this entrance run from 3 to 7 knots, with eddies and confused rippings.

Salmon Bank extends $1\frac{1}{2}$ mile South from Cattle Point, a bare point about 50 feet high, the sloping termination of Mount Finlayson, and the S.E. extreme of San Juan Island; the least depth of water found on it is 10 feet, with rocky patches, marked in summer by kelp.

Whale Rocks, on the eastern side of the entrance, are two black rocks a cable's length apart, and 3 or 4 feet above high water. A patch, on which kelp grows, with one fathom on it, extends 2 cables S.E. of them, otherwise

they are steep-to, but it is not recommended to pass them nearer than a quarter of a mile, as the tides set strongly over them.

Directions.—In entering Middle Channel from the westward or southward, Cattle Point should be given a berth of at least $1\frac{1}{2}$ mile. Mount Erie, a remarkable summit on Fidalgo Island, 1,250 feet high, in line with Jennie Point N.E. by E. $\frac{1}{2}$ E., leads $1\frac{1}{2}$ mile South of Salmon Bank in 13 fathoms; when the entrance of the channel is open, bearing N.N.W., or when Goose Island, a small isle on the western side of the entrance, is in one with Turn Island, and Orcas Nob bearing N.N.W. $\frac{1}{2}$ W., a vessel will be well to the eastward of the bank, and may steer in for the passage. Orcas Nob is a remarkable conical hill, with a bare stony summit, 1,100 feet above the sea, rising over the West side of Orcas Island.

Griffin Bay is an extensive indentation on the eastern side of San Juan, immediately within the southern entrance of Middle Channel. Although so spacious, yet from the great depth of water there is but a limited portion of the bay available for anchorage, and this is in the southern angle, immediately off the remarkable prairie land between two forests of pine trees. *Half-tide Rock*, just awash at high water, lies W. $\frac{1}{2}$ N., distant $1\frac{1}{2}$ mile from Harbour Rock, and 4 cables' lengths from the western shore of the bay. There is another rock, which only uncovers at or near low water, lying S.E. $\frac{1}{2}$ S. $4\frac{1}{2}$ cables from Half-tide Rock, and N. $\frac{1}{2}$ W. a third of a mile from the pier on the beach.

With all westerly or southerly winds, Griffin Bay affords good shelter but with those from North or N.E. it is considerably exposed. A stranger should drop an anchor directly 12 fathoms is struck. *North Bay*, in the N.W. angle of Griffin Bay, immediately under Park Hill, a bare grassy eminence, about 180 feet high, affords good anchorage in 4 to 10 fathoms, with all winds but those from S.E., to which it is somewhat exposed.

The greatest rise and fall at the southern entrance of Middle Channel, on full and change, is 12 feet; but little stream is felt at the anchorages.

Turn Island lies N.W. by N., nearly 5 miles from the South entrance of the Middle Channel. *Turn Rock* lies nearly a quarter of a mile N.E. of the island, and covers at three-quarters flood. The tide runs with great strength over this rock, and vessels passing up or down the channel are recommended to give it a good berth.

Friday Harbour is on the North side of the peninsula, immediately opposite to North Bay; it is rather confined, but offers good anchorage, and is easily accessible to steamers or small vessels. *Brown Island* lies in the entrance, and there is a passage on either side of it. The passage in, westward of Brown Island, is the widest and best, being 3 cables across. In the centre of the entrance there is a rocky patch, with $3\frac{1}{2}$ fathoms at low

water. Anchor with the passage between the island and main open, and the West cliffy point of the former bearing N.E. in 9 fathoms.

Reid Rock.—After rounding Turn Island, the Middle Channel trends to the westward, and Reid Rock lies right in the fairway, the least water on it is 12 ft., and it is surrounded by thick kelp, which, however, is sometimes run under by the tide. The rock bears from the North point of Turn Island W.N.W. 1 1-10th mile, and from the N.W. cliff point of Brown Island N.N.E. $\frac{1}{2}$ E. three-quarters of a mile. There is a clear deep channel on either side of it. After passing Reid Rock, there are no dangers which are not visible.

On its eastern side are the group known as the *Wasp Islands*, between and among which are several passages leading between Shaw and Orcas Islands, and communicating with the magnificent harbours and sounds which deeply indent the southern coasts of the latter.

On the western side of Middle Channel, 4 miles from Caution Point, is *Rocky Bay*, with the small island of *O'Neal* lying in the centre of it. The bottom is rocky, and as the bay does not afford much shelter, vessels are not recommended to use it unless in case of necessity.

Jones Island lies in the northern entrance of the channel, on the eastern side, nearly half a mile from Orcas, being separated from the latter island by Spring Passage. The island is generally wooded, but its western points are bare and grassy.

Spring Passage, between Jones Island and the West side of Orcas Island, is a safe deep water channel, and saves some distance to a steamer passing up or down Middle Channel, by the Douglas Channel. Some rocky patches extend a cable off the south-eastern side of Jones Island; and a rock which covers at 2 feet flood lies the same distance North of a small cove on the N.E. side of the island; so it is desirable to pass through in mid-channel; the western side of Orcas Island has, however, no dangers off it.

Flat-top Island is in the northern entrance of Middle Channel, N.W. by W. 2 miles from Jones Island; it is a third of a mile in length, wooded, and about 100 feet high. Off its western side, distant 2 cables, is a rock nearly a cable in extent and 15 feet above high water.

DOUGLAS CHANNEL may be said to be the continuation of Middle Channel, and leads into Haro Strait, between Orcas and Waldron Islands. There are other passages leading into the Haro, viz., westward of Flat-top Island, between it and Spieden and Suart Islands; and eastward of Flat-top, between it and Waldron Island. In the former the confused tides and eddies are liable to entangle a sailing vessel among Spieden and the neighbouring groups of small islands and rocks; in the latter, the *White Rock*, with its off-lying dangers, offers serious impediments to the safe navigation of the same class of vessels.

Both shores of the channel are free from danger. If necessary, vessels

will find a stopping place in the bay southward of the Bill of Orcas in 12 fathoms.

The channel eastward of Flattop Island, between it and White Rock, is about the same breadth as the one to the West of it, but the *Danger Rock*, with 5 feet on it, which lies a quarter of a mile S.E. by E. from the centre of White Rock, must be carefully avoided.

If passing between White Rock and Disney Point (the high stratified cliff of Waldron Island), the latter should be kept well aboard if the ebb is running, or a stranger is liable to be set on the rock.

It should be observed that the ebb stream continues to run down through the whole of the passages in the Archipelago, for two hours after it is low water by the shore, and the water has begun to rise.

Patos Island, $1\frac{1}{2}$ miles long, lies $2\frac{3}{4}$ miles E.N.E. from the East point of Saturna, on the South side of the Gulf of Georgia; the passage between them being the widest, and at present most frequented, though not always the best channel from Haro or Middle Channels into the Strait of Georgia. *Active Cove*, at its western end, is formed by a small islet connected at low water, and affords anchorage for one or two small vessels.

The passage into the Strait of Georgia between Patos and Sucia Islands, although considerably narrower than the one just mentioned, is for several reasons at times to be preferred, especially for vessels passing through Middle Channel, or for sailing vessels with a N.W. wind.

If intending to take the passage between Patos and Sucia, either up or down, an excellent mark for clearing the *Plumper* and *Clements Reefs*, which are dangerous patches lying southward and northward of Sucia, is to keep the remarkable round summit of Stuart Island, 650 feet high, just open westward of *Skipjack Island*, the westernmost wooded island North of Waldron; this leads well clear of both the reefs, and the same course, N.E. $\frac{3}{4}$ N., continued, would cross Alden Bank in 5 fathoms.

If taking the passage from the Middle or Douglas Channels, keep the white faced cliffs of Roberts Point well open westward of Patos Island, or keep the West end of Patos Island on the starboard bow until the marks before described are on, when steer through the passage. If the ebb stream is running, it is better to keep the Patos Island shore aboard; 16 fathoms will be found on the Sucia shore, but it is not recommended to anchor unless positively necessary.

In standing to the north-eastward, when Clark Island is open of the East end of Matia, or Puffin Islet, a vessel will be eastward of Clements Reef.

SUCIA ISLAND is of a horse-shoe shape, remarkably indented on its eastern side by bays and fissures, running in an East and West direction; the largest of these, *Sucia Harbour*, affords fair anchorage. The island is from 200 to 300 ft. high, thickly covered with pines, and its western side a

series of steep wooded bluffs. The dangers lying off it are Plumper and Clements Reefs; the former has 10 feet water on it, and lies S.W. by S. $1\frac{1}{4}$ mile from Lawson Bluff, the highest N.W. point of the island; N.N.W. $2\frac{1}{2}$ miles from the Bill of Orcas, a remarkable bare knob point on the island of that name; and S. by E. nearly 2 miles from the East point of Patos Island. There is a deep passage between Plumper Reef and Sucia, but it is not recommended.

Clements Reef has 9 feet on it, and lies N.E. $\frac{1}{4}$ N. $1\frac{1}{2}$ mile from Lawson Bluff; N.W. $\frac{1}{4}$ W. one mile from Ewing Island, the N.E. point of Sucia; and E. $\frac{1}{4}$ N., 2 miles from the East end of Patos. Some rocky patches covering at high water, and marked by kelp, lie between Clements Reef and Ewing Island, and it is not safe to pass between them. There is a deep channel of more than a mile in breadth between Sucia and Matia, the island to the eastward of it.

Parker Reef is a considerable patch lying in the passage between Sucia and Orcas Islands, and at low water uncovers a quarter of a mile of rock and sand; its eastern end always shows its rocky summit above water, and bears from Nob Point or Orcas Bill N.E. $\frac{1}{4}$ E. $2\frac{1}{4}$ miles, and from the East point of Sucia S. $\frac{1}{4}$ E. $1\frac{1}{2}$ mile. There is a passage on either side of the reef; that to the southward, between it and Orcas, is half a mile wide, but a stranger is recommended not to use it.

Matia Island, a little more than a mile eastward of Sucia, has been before alluded to.

LOPEZ ISLAND.—We now return to the islands and passages on the eastern side of Middle Channel. Lopez is the southernmost of the islands, and helps to form the western side of Rosario Strait, as it does the eastern of the Middle Channel. It is long, 9 miles North and South, 3 miles East and West, and thickly wooded, but differs from all the other islands of the Archipelago in being much lower and almost flat, except at its northern and southern extremes, where elevations occur of a few hundred feet. Its southern side is a good deal indented by bays and creeks, which, however, from their exposed position and rocky nature, cannot be reckoned on as anchorages. On its western side, in Middle Channel, is a creek terminating in an extensive lagoon, the former offering great facilities for beaching and repairing ships. On the North shore is Shoal Bay, affording anchorage; and on the East is the spacious and excellent sound of Lopez, which has an entrance from Middle Channel, as well as three distinct passages from Rosario Strait.

McKaye Harbour is on the South coast of Lopez Island, 2 miles eastward of the entrance to Middle Channel. It is entered between *Jennis Point* on the South, and *Long* and *Charles Islands* on the North; from the latter it runs easterly for a mile, and then trends to the southward for a short distance, terminating in a low sandy beach. In the entrance there are from 8

to 12 fathoms, muddy bottom, but with the prevailing south-westerly winds the anchorage is a good deal exposed. Coasters or small vessels drawing 12 ft. may get shelter in the South bight; with northerly or easterly winds there would be fair anchorage.

Shark Reef, on the western side of Lopez Island, immediately within Middle Channel, and half a mile northward of White Cliff, consists of two rocks generally awash, extending something more than a cable off shore, and which must be avoided by vessels working up the channel. There are no dangers on the coast of the island above this reef.

Carren Creek, on the West side of Lopez Island, is 4 miles within the entrance of Middle Channel. The western entrance point is a low sandy spit, close round which there are 3 fathoms, and on it a vessel might be beached and repaired with much facility, and perfectly sheltered; the creek terminates in a large salt lagoon.

Upright Channel, separating Lopez from Shaw Islands, is a deep steep passage leading from the Middle Channel to the sounds of Orcas and Lopez, and by several passages into Rosario Strait. The narrowest part of the entrance is between *Flat Point* and *Canoe Island*. Here for a short distance it is scarcely 2 cables in breadth. A rock lies a cable South of the South point of Canoe Island, marked by kelp. The tides are not considerable in the channel. At $1\frac{1}{2}$ mile from Flat Point on the South side of the channel is Upright Hill, the steep cliffy North extreme of Lopez Island. It is covered with timber, and from 200 to 300 feet high.

Shoal Bay lies immediately eastward of Upright Hill, and runs in a S.S.E. direction for a mile to its head, which is separated from False Bay in Lopez Sound, by a low neck a cable's length across. Although apparently a considerable sheet of water, the anchorage for large vessels is much limited by a shoal which extends from just within the point of Upright Hill towards the eastern point of the bay, and more than halfway across.

LOPEZ SOUND, on the eastern side of the island of that name, runs in a S.S.E. direction for $7\frac{1}{2}$ miles, or nearly the whole length of the island, its head reaching within half a mile of the waters of Fuca Strait. Its eastern side is formed partly by Lopez and partly by Decatur and Blakely Islands, lying parallel with it; and between these islands, as well as northward of the latter, are passages leading into Rosario Strait. The average breadth of the sound is nearly $1\frac{1}{2}$ mile, and there is a convenient depth of water for anchorage in almost every part of it.

The sound may be entered from the westward through Middle and Upright Channels, and from the eastward by the Obstruction Passage, or by Thatcher and Maury Passages.

Until as far South as *Frost Island*, which is nearly 2 miles within the entrance of the sound, the general depth of water is from 20 to 30 fathoms. Thatcher Passage, leading into Rosario Strait, between Blakely and Decatur

Islands, now opens out, and in proceeding up the sound the depth soon decreases to 9 fathoms, varying between that and 5 fathoms for a distance of $2\frac{1}{2}$ miles, or as high as Houston Island. The only impediment between Frost and Houston Islands is the *Middle Bank*, on which, however, there are not less than 3 fathoms at low water. It is half a mile in extent North and South, 2 cables East and West, and lies almost in the centre of the sound, its North end bearing S.S.E. a quarter of a mile from the South end of Frost Island, and S.W. by W. $\frac{1}{4}$ W. $1\frac{1}{2}$ mile from the North entrance point of Thatcher Passage, or South point of Blakely Island.

Entrance Shoal, with 2 fathoms on it, and marked by kelp, must be avoided by vessels working in. It lies E. by N. $\frac{1}{4}$ N. $1\frac{1}{2}$ mile from Upright Point, and half a mile from the shore of Blakely Island; there is deep water on either side of it.

False Bay is on the West side of the sound, a mile from Shoal Bay, their heads being only separated by a low narrow neck, a cable's length across, the cliffy extreme of the peninsula being *Separation Point*. It is unfit for anchorage, except for small vessels. *Half-tide Rock*, covering at half-flood, and not marked by kelp, is in the track of vessels entering. It lies S.E. by E. $\frac{1}{4}$ E. three-quarters of a mile from Separation Point, and N.N.W. $\frac{1}{4}$ W. 4 cables from Arbutus Island. *Frost Island* lies close off Gravel Spit on the West side of the sound. It is wooded, and its western side a steep cliff, between which and the spit end there is a narrow channel of 5 fathoms.

The *Black Islets* are a ridge of steep rocky islets, lying within and across the entrance of Maury Passage. At 2 cables S. by W. from the southernmost of these islets is a rock which covers at quarter-flood. There is good anchorage in 5 fathoms in the bight, westward of *Crown Islet*.

THATCHER PASSAGE, between Blakely and Decatur Islands, is the widest and most convenient passage into Lopez Sound from Rosario Strait. It is $1\frac{1}{2}$ mile in length, and its narrowest part 4 cables wide, with a general depth of from 20 to 25 fathoms. *Lawson Rock*, lying almost in the centre of the eastern entrance, is the only danger, and covers at 2 feet flood. There is a good passage on either side of the rock; that to the southward is the best.

MAURY PASSAGE, between Decatur Island and the N.E. point of Lopez, is the southernmost entrance to the sound from Rosario Strait. It is scarcely 2 cables wide at the entrance, with a depth of 12 fathoms. The black islets lie across the western entrance, and it is necessary to keep to the southward, between them and Lopez.

OBSTRUCTION PASSAGES.—Obstruction Island lies in the centre of the channel, between the North point of Blakely and the S.E. point of Orcas Island, and forms a safe and convenient communication on either side of it, between the Middle Channel and Rosario Strait by Upright Channel; they likewise lead from Rosario Strait to the sounds of Orcas and Lopez. The

passes are more adapted to steam than sailing navigation, although there would be no difficulty to a sailing vessel with a leading wind and fair tides. Small vessels would never find any difficulty by studying the tides.

North Obstruction Pass is about $1\frac{1}{4}$ mile long, and its average breadth 2 cables. There are no dangers which are not visible. The eastern entrance bears from Cypress Cone, a remarkable bare peak on the North end of Cypress Island, W.S.W.

South Obstruction Pass, though narrower than the North, is perhaps the better channel of the two. It is not above three-quarters of a mile in length, and is perfectly straight; its direction N.E. and S.W. In its narrowest part it is not much over a cable wide. On the South side of the eastern entrance two rocks extend off Blakely Island, the inner one always above high water; the outer, a long black rock, is nearly a quarter of a mile off shore, and just awash at high water.

SHAW ISLAND is much of the same character as Lopez, though considerably smaller, being about 3 miles in extent, measured in any direction. It is the continuation of the eastern side of the Middle Channel, and between it and Orcas Island lie the Wasp group, among which are several passages leading to the harbours of Orcas and Lopez, and into Rosario Strait.

The Wasp Islands, five in number, besides some smaller islets and rocks, lie on the eastern side of Middle Channel, between Shaw and Orcas Islands. *Yellow Island*, the westernmost of the group, is rather remarkable from its colour, grassy and nearly bare of trees, the remainder of the group being wooded. From its West end a sandy spit extends for a cable's length, with a rock on the extreme, bare at low water, and round which kelp grows; therefore, this point should be given a berth in passing up or down Middle Channel. Northward of *Yellow Island* are *Brown* and *Reef Islands*; off the West side of the latter a reef extends for more than a cable's length. *Wasp Passage* leads through this group to the sound of Orcas and to Rosario Strait. With the assistance of the chart a steamer would find but little difficulty in passing through it, though the passage by Upright channel is to be preferred.

If desired, a vessel may pass into Wasp Channel to the southward of *Yellow Island*, between it and *Low Island*, a small islet, thence northward of *Nob Islet*, and as before directed, between *Crane* and *Cliff Islands*.

There is yet another passage into Wasp Channel southward of *Cliff Island*, between it and *Neck Point*, the remarkable western extreme of *Shaw Island*. These two latter passages are the shortest into the Wasp channel for vessels from the southward. The eye will be found the best guide; a good lookout is necessary, and to a steamer there is no difficulty.

North Passage.—This clear deep channel leading to *Deer Harbour*, the westernmost port in *Orcas Island*, lies between *Steep Point*, the S.W. point

of Orcas, and Reef Island, the northernmost of the Wasp group. It is nearly a quarter of a mile wide and 20 fathoms deep, and the only danger to avoid on it is the reef off the West side of the latter island. Deer Harbour may be entered equally well between Reef and Brown Islands. A patch of 2 fathoms lies S.W. by W. nearly a cable from the N.W. point of the latter.

ORCAS ISLAND, the largest of the archipelago, has been before noticed, as forming the western side of Rosario Strait. Its most elevated part, Mount Constitution, is on the eastern side. On the West side is the *Turtle Back*, a long wooded range 1,600 feet, and West of it again, rising immediately over the sea, that singular bare-top cone known as *Orcas Nob*, a remarkable object when seen either from the North or South.

The ports of Orcas are Deer Harbour, West and East Sounds; but on the western and northern sides of Orcas there is no convenient anchorage. A vessel might drop an anchor if necessary southward of the Bill of Orcas, a remarkable projecting bare point, with a nob on its extreme.

The North coast is steep and precipitous, except between the *Bill* and *Thompson Point*, a distance of $2\frac{1}{2}$ miles. Immediately off this part of the coast is Parker Reef, described in page 281. From Thompson Point, a bare cliffy point, the coast forms a slight curve easterly to *Lawrence Point*, distant 6 miles.

Lawrence Point, the sloping termination of the high range of Mount Constitution, is the eastern extreme of Orcas Island; on its northern side it is a steep and almost perpendicular cliff.

Deer Harbour is the westernmost of the three ports of Orcas, and, as before observed, is conveniently entered from the Middle Channel by North Passage between Steep Point of Orcas and Reef Island, or between the latter and Brown Island of the Wasp group. The harbour is a mile long in a North and South direction, and about the same breadth at its southern end; it narrows, however, rapidly, and terminates in a shoal creek, and fresh water streams fed from a lake. *Fawn Islet* lies off the steep cliffy shore of the West side of the harbour; below it the depth of water varies from 10 to 15 fathoms, abreast and above it from 5 to 8 fathoms. The bottom is mud.

West Sound may be entered from Middle Channel, either by the Wasp or Upright Passages already described, or from Rosario Strait by either of the Obstruction passes. Having entered by the Wasp Passage, cleared the Passage Rock, and being off *Broken Point*—a remarkable cliffy point—the extreme of a small peninsula on the North side of Shaw Island, West Sound will be open, extending in a N.W. $\frac{1}{2}$ N. direction for more than 2 miles, with Orcas Nob immediately over the head of it. The breadth of the sound is about three-quarters of a mile, and the depth of water from 10 to 16 fathoms, with no hidden dangers.

THE MIDDLE CHANNEL.

White Beach Bay, so named from the quantities of white clam shells, the remains of native feasts, lying on its shores, and giving them the appearance of white sandy beaches, is on the eastern side of the sound, 2 miles above Broken Point. *Massacre Bay* is the continuation of the head of the sound, between Haida and Indian Points, and the anchorage is nearly a mile above White Beach Bay. *Harbour Rock*, covering at one-third flood, lies almost in the centre of the bay, between the two entrance points.

Harney Channel, between Orcas and Shaw Islands, connects the West and East sounds of Orcas. It commences at Broken Point, and runs in an easterly direction for 3 miles, when it enters Upright Channel between Foster and Hankin Points; the former is a low sloping green point, the southern termination of the peninsula which separates the two sounds; the latter is the eastern bluff wooded point of Shaw Island. N.W. from Hankin Point is a rocky patch which lies more than a cable off shore, and covers at half flood. *Camp Cove* is immediately northward of Foster Point; it is a convenient cove for boats, or a small vessel. *High-water Rock* lies more than a cable's length from the shore, and half a mile north-eastward from Foster Point; it is awash at high water.

Blind Bay, on Shaw Island, is on the South shore, midway between Broken and Hankin Points. A small round islet, partially wooded, lies in the centre of the entrance, and a reef of rocks, covering at high water, extends from its western point, almost choking the entrance on that side. A rock, covering at a quarter flood, also lies off the eastern side of the islet, so that the bay is only eligible for coasters, which should keep the island close aboard in entering.

East Sound.—Entering this sound by Upright Channel, or through the Wasp Passages and Harney Channel, when abreast Upright Hill, from which *Diamond Point*, the western point of the sound, bears North 2 miles, its entrance will be easily made out. If by the Obstruction Passes, as soon as a vessel is at their western entrance, the whole length of the sound will be open, bearing N.W. $\frac{1}{2}$ W. A remarkable conical hill, over 1,000 feet high, rises on either side of the entrance, which lies between Diamond and Stockade Points. From between these points the sound runs in a N.W. by W. direction for 6 miles; for the first 2 miles the breadth is three-quarters of a mile; it then contracts at Cascade Bay to half a mile, and opens out again above to more than a mile. The head of the sound terminates in two bays, a jutting cliffy point separating the two. The general depth of water in the sound is 15 fathoms.

Stockade Bay, on the eastern side of the sound entrance, nearly a mile North of Stockade Point, the north-western entrance point of North Obstruction Pass, affords anchorage in 8 fathoms, about 3 cables from the shore.

Green Bank, on the western side, immediately opposite Stockade Bay, is a bank of sand extending halfway across the sound; on it there are from 5 to

9 fathoms, with one patch of 4 fathoms. On the eastern side of the sound, 2 miles above Stockade Bay, is a small hook facing the S.E., forming Cascade Bay. A large stream falls by a cascade into the bay, and it would be a convenient place to water a ship.

HARO STRAIT.

HARO STRAIT, the westernmost of the three channels leading from the Strait of Fuca into the Strait of Georgia, is bounded on the western side by Vancouver Island, and its off-lying smaller islands and reefs, and on the eastern side by the islands of San Juan and Stuart, and runs in a N.W. by N. direction for 18 miles; it then turns sharply to the N.E. round Turn Point of Stuart Island, for a further distance of 12 miles, leaving the Saturna Island to the westward, and Waldron and Patos Islands to the eastward, when it enters the Strait of Georgia between Saturna and Patos Islands.

It is for the most part a broad, and for its whole extent a deep navigable ship channel; but on account of the reefs which exist in certain parts, the general absence of steady winds, the scarcity of anchorages, and, above all, the strength and varying direction of the tides, much care and vigilance is necessary in its navigation, and it is far more adapted to steam than to sailing vessels.

Besides the main stream of the Haro Strait thus described, there are several smaller channels and passages branching from it by which vessels may enter the Strait of Georgia; thus the Swanson Channel leads into the strait by the Active Pass (formerly the Plumper Pass, by which name it is more generally known), and the Trincomalie and Stuart Channels by the Portier Pass, or the Dodd Narrows.

These channels may be again entered by smaller ones; thus Sidney and Cordova Channels, on the western side of Haro Strait, lead by Moresby and Shute Passages into the Swanson and Stuart Channels, and finally into the Strait of Georgia. These channels are essentially adapted to steam navigation, or to coasting vessels; they afford smooth water, and many of them anchorages. They will be described in their proper order.

Middle Bank, lying in the southern entrance of Haro Strait, E. by N. 4 miles from Discovery Island, and almost in mid-channel, is a rocky patch about 2 miles in extent each way, and the least water found on it is 10 fathoms. In bad weather there are heavy tide rippings on and in the vicinity of this bank, which are dangerous to boats or small craft.

Zero Rock.—The principal dangers in the southern part of Haro Strait are the Zero Rock and the Kelp Reefs; the former lies on the West side of the strait, is about half a cable in extent, covers at three-quarters flood, and its vicinity is marked by kelp. It bears from the East point of Discovery

HARO STRAIT.

Island N.W. $6\frac{1}{2}$ miles, and from the high white cliff of Cowitchin Head E. by S. $3\frac{1}{2}$ miles.

The Kelp Reefs lie almost in the centre of Haro Strait, N.N.W. $\frac{1}{2}$ W., $7\frac{1}{2}$ miles from the East point of Discovery Island, E. by N. $\frac{1}{2}$ N. 5 miles from Cowitchin Head, and East 2 miles from the South end of Darcy Island. They uncover at low springs, and are well marked by kelp, which extends in detached patches to Darcy Island. The *Unit Rock* lies E. by N. $\frac{1}{2}$ N. three-quarters of a mile from the S.E. point of Darcy Island, and uncovers 2 feet at low tides.

DIRECTIONS.—Vessels passing up Haro Strait to avoid the above dangers, after rounding Discovery Island at the distance of a mile, should steer N.N.W., or for Kellett Bluff of Henry Island, a remarkable steep rocky headland on the eastern side. This course will clear the Kelp Reefs by a mile. In working up, when standing westward, a vessel should tack when Low Island is shut in with the S.E. point of Sidney Island, which will give the Zero Rock a good berth; but when approaching the Kelp Reefs, Bare Island must be kept well open to the eastward of the same point to avoid them. The eastern or San Juan shore is steep close-to.

When abreast Kellett Bluff from half a mile to a mile, a N.W. by N. course will pass the same distance from Turn Point of Stuart Island. There are no dangers off this point; but whirling eddies and tide rippings, caused by the meetings of the streams from so many channels, are generally met with, particularly with the ebb. A vessel may reach this point with a fresh southerly wind, but will almost invariably lose it here, until having opened out the middle channel eastward of San Juan.

After rounding Turn Point, a N.E. $\frac{1}{2}$ N. course for 10 miles will lead to the northern entrance of Haro Strait, between the East point of Saturna and Patos Islands. This passage is $2\frac{1}{2}$ miles in breadth, but is subject to heavy tide rippings and eddies; it is recommended when possible to pass through the centre of it. The flood from the Rosario Strait, which is met with as soon as the passage between Orcas and Sucia Islands is open, is apt to set a vessel towards the East point of Saturna, off which and Tumbo Island there is much uneven and broken ground with heavy races. This point should be given a berth of a mile.

The ebb sets to the eastward even before the Strait of Georgia is well open, and a vessel finding herself not likely to weather Patos should pass between it and Sucia, where there is a good clear passage of above a mile in breadth; if this passage is taken, the Patos Island shore should be kept rather aboard. Beware of the Plumper and Clements Reefs; the former lies S.W. by S. $1\frac{1}{2}$ mile from the N.W. bluff of Sucia Island, and has 10 ft. water on it; the latter N.E. $\frac{1}{2}$ N. the same distance from the same bluff, and has 9 feet over it. When in the Strait of Georgia from W. by N. to W.N.W. is a fair mid-channel course. If bound for Fraser River, a N.W.

by W. course from the centre of the channel between Patos Island and East Point will lead to the sand heads, the distance nearly 20 miles. Entering the strait, and having passed to the northward of Patos Island, if the ebb is running a vessel is extremely liable, unless with a commanding breeze, to be set to the eastward and down the Rosario Channel.

The northern shore of Sucia Island should by all means be avoided. If Alden Bank can be fetched, it offers a good anchorage while waiting for a tide.

Cormorant Bay.—Between Gordon and Cowitchin Heads, on the western side of Haro Strait, is a good stopping place, and easy of access under most circumstances. It may be entered either to the southward or northward of Zero Rock; the passage to the southward is $1\frac{1}{2}$ mile in breadth, with a depth of 20 fathoms. *Mount Douglas*, a remarkable hill, 696 feet high, with its summit bare of trees, rises immediately over the coast at the head of the bay. *Johnstone Reef* lies three-quarters of a mile from the shore, midway between Cadboro Point and Gordon Head, is marked by kelp, and of small extent. Three shoal patches, with from 6 to 12 ft. on them, lie W. $\frac{1}{2}$ S., one to $1\frac{1}{2}$ mile distant from Zero Rock. There is but little stream of tide in Cormorant Bay when within the Zero Rock, and the holding ground is good.

Although there are many harbours among the archipelago of islands which form the Haro Strait and its tributary channels, yet the number eligible for sailing vessels overtaken by darkness or an adverse tide is comparatively small.

Between Cormorant Bay and the northern entrance of Haro Strait, Plumper Sound and Cowlitz Bay are the only eligible stopping places for a sailing vessel seeking shelter.

Stuart Island, indeed, affords two fair harbours, and Roche Harbour, at the north-west end of San Juan Island is a suitable anchorage for steamers or small coasters, but no sailing vessel of moderate tonnage could enter either under ordinary circumstances without great loss of time as well as risk.

Tides.—The stream of tide runs fairly through the main channel of Haro Strait, outside the Kelp Reefs, and inside them through the Cordova and Sidney Channels, passing outside the Kelp Reefs, and eastward of Sidney Island, a part of the flood stream will be found to branch off to the eastward, between San Juan and Stuart Islands, and there meeting the flood from the Middle Channel, cause heavy races and eddies, so that although there are deep-water channels between these islands, they are not recommended for sailing vessels; in like manner the flood runs to the N.W. between the group of islands northward of Sidney Island, and through Shute and Moresby Passages, though the main stream will be found to run fairly between Stuart and Moresby Islands.

PLUMPER SOUND.—If from any cause it should be found necessary to anchor in that bend of the Haro Strait between Stuart Island and the East point of Saturna Island, this sound is recommended as a safe and convenient

North Pacific.

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nient harbour, easy of access with the wind from any quarter. It is formed between Pender and Saturna Islands, and the entrance lies N.N.E. $\frac{1}{4}$ E. 5 miles from Turn Point of Stuart Island, and an equal distance from the East point of Saturna. *Blunden Island*, about 2 cables in length, and close to the shore, forms the western entrance point; *Monarch Head*, a high, bold, rocky headland, the eastern. The sound runs in a W.N.W. direction for 6 miles, with an average breadth of $1\frac{1}{2}$ mile. There is anchorage in a moderate depth of water in most parts of it, as well as several bays or harbours if preferred.

There are no dangers at the entrance; either shore may be approached close, in working up, and but little tide is felt.

Excellent anchorage may be had in almost any part; the most convenient is off the entrance of Browning Harbour, on the South side of the sound, in 8 fathoms. Above Browning Harbour, the only danger to be avoided in working up the sound is *Perry Rock*, with 6 feet on it, marked by kelp; it is 2 cables from the shore and N.W. by N., three-quarters of a mile from Razor Point, the North point of the harbour.

Browning Harbour is on the South side of Plumper Sound, 3 miles within the entrance; it runs in a West direction for $1\frac{1}{2}$ mile, and is a third of a mile wide, but rather less at the entrance. The depth of water decreases gradually from 10 fathoms at the entrance to 4 fathoms at its head, with good holding ground.

Lyall Harbour and Winter Cove lie in the S.E. corner of Plumper Sound, and are indentations in the N.W. end of Saturna Island.

Lyall Harbour is the southernmost, and its southern entrance point, a cliffy bluff, bears N. $\frac{1}{4}$ E., 2 miles from the entrance of Browning Harbour. The harbour runs East for $1\frac{1}{2}$ mile, gradually narrowing and terminating in a sandy beach with a good stream of fresh water at its head; but the Crispin Rock, with 6 ft. on it at low water, decreases its value as a harbour for sailing vessels. This rock is a mere pinnacle, nearly half a mile within the entrance; there is no kelp to give warning of its position, and it lies exactly in the middle of the harbour. *Boot Cove*, on the South side of the harbour, a third of a mile within the South point, has 3 fathoms water, and is a convenient spot for repairing a vessel. A small islet lies off its western entrance point.

Samuel Island, between Saturna and Mayne Islands, is almost connected with either, but leaving 2 passages by which boats or even small coasters may pass into the Strait of Georgia at proper times of tide. This island is indented on its southern side by several bays, among them *Winter Cove*, which is formed between its south-eastern side and the N.W. point of Saturna, and is only half a mile northward of Lyall Harbour. The depth of water in the cove being only from 2 to 3 fathoms, it is only fit for small vessels, which must pass to the westward of King Islets, and on either side of the Minx Reef.

NAVY CHANNEL is a continuation of the western part of Plumper Sound, and leads between Pender and Mayne Islands into the Trincomalie Channel. Independently, therefore, of its value as an anchorage, Plumper Sound becomes a high road for vessels bound into the Strait of Georgia or Fraser River by the Active Pass, or to Nanaimo, or any of the north-western ports of Vancouver Island. From the north-western end of the sound abreast Fane Island the channel runs West for 3 miles, when it enters Trincomalie Channel between Mayne and Prevost Islands; its average breadth is half a mile.

Conconi Reef lies about midway through Navy Channel, $1\frac{1}{2}$ mile from Fane Island, and nearly 2 cables off the northern shore, and narrows the strait at that part to a third of a mile. It is a ledge of rocks extending in the direction of the channel for more than a cable's length, and covering at half tide; its vicinity is marked by kelp.

The *Enterprise Reefs* are two rocky patches, the westernmost of which dries at low water, and both are marked by kelp. The outermost of these reefs lies W.N.W. 1 mile from *Dinner Point*, the N.W. entrance point of Navy Channel, and S. by E. two-thirds of a mile from *Helen Point*, the South point of Active Pass. Vessels using Navy Channel should keep rather southward of mid-channel. The shores of Pender Island are bold.

Bedwell Harbour, on the S.E. part of Pender Island, the entrance to which bears North 3 miles from Turn Point of Stuart Island, and is the same distance westward of the southern entrance of Plumper Sound, is, on account of its narrower entrance, not so eligible a stopping place for vessels waiting the tide as the latter; but for steamers it is a good harbour. Its narrowest part, which is at the entrance, is a quarter of a mile in breadth, but it soon opens out to half a mile, and runs in a W.N.W. direction for 2 miles, the depth of water being from 5 to 10 fathoms, mud bottom. The only danger which does not show is the *Drew Rock*, with 10 feet on it, in the centre of the harbour a third of a mile from its head. *Camp Bay*, between Bedwell Harbour and Plumper Sound, and half a mile westward of Blunden Island, offers shelter as a stopping place to small craft, when not convenient to work into either of these ports.

STUART ISLAND, lying 3 miles north-westward of the northern part of the island of San Juan, is 3 miles long in an East and West direction, of an irregular shape, and about 650 ft. high, the summits of the hills partially bare of trees. *Turn Point*, its N.W. extreme, a bold cliffy bluff, forms the salient angle of the Haro Strait, where it changes its direction suddenly from N.W. by N. to N.E. before entering the Strait of Georgia. There are two anchorages in Stuart Island, *Reid Harbour* on its southern side, and *Prevost Harbour* on its northern, but both are small and intricate for sailing vessels above the size of coasters.

Johns Island, with its numerous off-lying reefs, lies to the eastward of

HARO STRAIT.

Stuart Island, and separated from it by a navigable channel of 10 fathoms, but it is narrow, and not recommended but for coasters acquainted with the locality.

Spieden Island, lying between San Juan and Stuart Islands, is $2\frac{1}{2}$ miles long in an East and West direction, and very narrow; its southern side grassy and bare of trees, its summit and northern side thickly wooded. *Green Point*, its eastern extreme, is a sloping grassy point. There is a channel on either side of Spieden Island. New Channel to the northward, and Spieden Channel to the southward.

Spieden Channel, between the island of that name and San Juan, has a general W. by S. direction. Its eastern entrance, between Green Point and the N.E. point of San Juan, is two-thirds of a mile wide, and for 2 miles the water is deep and clear of positive dangers; the meeting of the flood-tide, however, from Haro Strait with that from the Middle Channel, causes heavy rippings and irregular eddies, and these, together with the general absence of steady winds, render the navigation always tedious and dangerous for sailing vessels; its western entrance is encumbered with numerous reefs and shoals with irregular soundings.

Sentinel Island stands in the western entrance of this channel. It is small, bare on its southern side, about 150 feet high, bears E.S.E. two-thirds of a mile from Spieden Bluff. *Centre Reef* is a dangerous patch, awash at low water, and almost in the centre of the channel. It bears from Sentinel Island S.W. by S. nearly half a mile; from Spieden Bluff, the western extreme of that island, S.E. by S. more than two-thirds of a mile; and from Morse Island, off the North point of Henry Island, N.N.E. $\frac{1}{2}$ E. one mile; the kelp will generally be seen round the reef, but it is sometimes run under. *Danger Shoal* is also at the western entrance; it has two fathoms on it, and is marked by kelp, though not always to be distinguished. It bears from Spieden Bluff S.S.W. $\frac{1}{4}$ W. three-quarters of a mile. *Bare Islet* is a rock, about 15 feet high, lying in the southern part of the channel, E. by N. $\frac{1}{2}$ N. one mile from Morse Island. There is a shoal patch of 15 feet nearly 2 cables N.W. by N. from it.

DIRECTIONS.—Vessels bound from Haro Strait to the eastward through the Spieden Channel should pass about a quarter of a mile or less northward of Morse Island, and then steer for Green Point, the East extreme of Spieden Island, until Sentinel Island bears N.W.; the dangers will then be passed, and a straight course may be steered through.

If bound westward through this channel, if the passage between Spieden and Sentinel Islands is not taken, the shore of Spieden Island should still be kept aboard within a quarter of a mile to avoid the tide races.

New Channel to the northward of Spieden Island, though narrower than the one just described, is deep, more free from danger, and the navigation of it more simple. The northern shore of Spieden Island is bold and steep, and should be kept aboard; the narrowest part of the channel is a quarter of a mile between Spieden and the Cactus Islands.

SAN JUAN ISLAND, the western coast of which forms for some distance the eastern boundary of Haro Strait, is of considerable size, being 13 miles in length in a N.W. and S.E. direction, with an average breadth of about 4 miles.* Its western shores are steep and rocky, and afford no anchorage, soundings from 100 to 150 fathoms being found within half a mile of the coast. *Mount Dallas* rises abruptly to a height of 1,086 feet, but the eastern side of the island falls in a more gentle slope, and affords a considerable extent of good land available for agricultural or grazing purposes. Towards the southern end, and visible from seaward, are some white buildings, the farming establishment of the Hudson Bay Company;† the south-eastern extreme, which forms one of the entrance points of the Middle Channel, terminates in a white clay cliff, over which rises *Mount Finlayson* to a height of 550 feet.

Off the N.W. end of San Juan lies *Henry Island*, being only separated from it by a narrow channel called *Mosquito Passage*. *Henry Island* would be taken as a part of San Juan, the passage appearing merely as an indentation.

Kellett Bluff, the S.W. point of the island, makes as the most prominent headland on the eastern side of Haro Strait, when seen from the southward. Immediately eastward of it is *Open Bay*, which has more the appearance of a channel than the true one, *Mosquito Passage*. There is no shelter either in the bay, or anchorage in the passage, for anything beyond coasters.

Mosquito Passage runs in a northerly and N.N.W. direction for 3 miles, is something over half a mile in breadth, and is studded with numerous reefs, which are marked by kelp. When a mile within the passage, *Westcott Creek*, an indentation in San Juan, branches off to the N.E., and affords a haven for coasters. At the northern entrance of *Mosquito Passage*, the space between San Juan and *Henry Islands* opens out considerably, and the depth of

* Lord Milton's excellent work on the political importance of San Juan, and the discussion which it has given rise to, has been before alluded to.

† Captain R. C. Mayne, R. N., in his interesting book, "Four Years in British Columbia and Vancouver Island" (employed on the survey), thus speaks of San Juan Island. There is more land available for agriculture here than on any other of the group; and of this the Hudson Bay Company took advantage some years ago, and established a sheep-farm upon it. This farm has ever since its establishment been in charge of Mr. Griffin, a gentleman whose kindness and hospitality render him every one's friend. It is situated on a beautiful prairie at the S.E. end of the island, which, rising 140 feet above the water, looks most attractive to the emigrant passing onward toward the Fraser. I have never seen wild flowers elsewhere grow with the beauty and luxuriance they possess here. Perhaps I cannot illustrate the attractions of St. Juan better, than by saying that it was the spot selected by his Excellency the Governor's daughter and niece in which to spend their honeymoon.

At one time I believe the Company had as many as 3,000 sheep on the island, distributed at various stations, all under Mr. Griffin's charge. His house, which is very pleasantly situated, looks out on the Strait of Fuca, and commands a magnificent view up Admiralty Inlet. Directly in front of it lies a bank, which is a very favourite fishing-stat on of the Indians, where they catch a large number of salmon and halibut.

water increases. This space forms *Roche Harbour*, which must be entered from the northward by vessels of burden; its entrance is somewhat confined but not uneasy of access, and it affords good shelter when within. *Morse Island*, a small flat clifly island, about 30 feet high, lies a quarter of a mile westward of the North point of Henry Island; and the entrance of Roche Harbour is half a mile eastward of the former. Small vessels leaving Roche Harbour, and bound southward, may take the Mosquito Passage.

WALDRON ISLAND lies in the northern entrance of the Middle Channel, and its anchorages are frequently available for vessels passing to or from Haro Strait. The island is thickly wooded, moderately high, and clifly on its southern and eastern sides, but falling to the northward, where it terminates in low sandy points. *Disney Point*, its southern extreme, is a remarkable high stratified bluff.

Cowlitz Bay, on the western side of Waldron, between Disney and Sandy Points, affords good anchorage with all winds, the depth of water from 5 to 8 fathoms, and the holding ground stiff mud; it may be sometimes more desirable to anchor here than to work 2 or 3 miles up into Plumper Sound, particularly for vessels coming up Middle Channel.

North Bay, on the N.W. side of the island, affords anchorage in 8 to 10 fathoms about a quarter of a mile off shore, but it is not by any means desirable place as Cowlitz Bay.

Danger Rock.—This dangerous reef, mentioned on page 280, with only 5 feet on it, and on which the kelp is rarely seen, lies S.E. by E. $\frac{1}{4}$ E., a third of a mile from White Rock, which is 25 feet above high water, and has also a covering rock extending 2 cables to the N.W. of it.

The **WESTERN CHANNELS of HARO STRAIT** may be used with advantage by steamers or coasters bound from the southern ports of Vancouver Island to the Strait of Georgia, or to the districts of Saanich, Cowichin, Nanaimo, and the numerous intermediate harbours; their advantages over the Haro Strait consist in a less strength of tide with sheltered anchorage in almost all parts, while in the latter strait the depth of water is so great, that it is impossible to anchor, and sailing vessels may frequently be set back into Fuca Strait, thus entailing great delay as well as risk. On the other hand, the western channels are not free from danger, yet with the assistance of the chart, and a good look out from aloft for kelp, they may be navigated during daylight with ease and safety.

Sidney Channel.—Having passed either inside or outside Zero Rock, and intending to take the Sidney Channel, between Sidney and James Islands, which is the best, the following directions should be observed.

The southern face of *James Island* is a moderately high and steep white clay cliff, its summit covered with trees; towards the eastern part of this cliff are two remarkable notches on its summit. Steer to the N.N.W. to bring Mount Tuam (on the southern point of Admiral Island) over the centre

between these two notches bearing N.W. by W., and this mark will lead westward of the 3-fathom patch off Darey Island, and between it and the shoal of 9 feet extending south-eastward of James Island.

The breadth of the channel is nearly a mile, with from 14 to 20 fathoms, until near its northern end, where a patch with 3 fathoms, marked by kelp, lies 3 cables' lengths off the western point of Sidney Island; this is avoided by not shutting in the passage between Darey and Sidney Islands, until the north-west end of Sidney Spit, a long, sandy tongue with a few trees on its extreme, bears N. There is good anchorage off this spit in 8 fathoms.

Cordova Channel, westward of James Island, between it and the main Island of Vancouver, is a fair passage with anchorage along the shore of the main island and little tide. It is not, however, to be preferred to the Sydney Channel, as a sand-bank with 15 feet on it lies in the centre of the southern entrance.

Miners Channel.—Low and Bare Islands are two small islands lying off the eastern side of Sidney Island, and between them and the latter there is a good passage, three-quarters of a mile in breadth, with 10 fathoms the least water. This channel may often prove convenient for vessels having passed up Haro Strait eastward of the Kelp Reefs, and desiring to take the inner channels to Saanich, Cowitchin, or through Stuart Channel. Midway between Low and Bare Islands, and on the line between their N.W. points, is a reef which uncovers.

Having passed to the northward of Sidney Island, either by Cordova, Sidney, or Miners Channels, the Shute or Moresby Passages may be taken as convenient.

Shute Passage.—To enter this passage, after leaving Sidney Spit, pass between Jones Island and the Little Group, then eastward of Coal Island, Knapp and Pym Islands, and between Piers and Portland Islands, when the Satellite Channel will be entered, which leads directly to Saanich, Cowitchin, and the western ports of Vancouver Island. This is a good, clear channel, and with the assistance of the chart may be used with much facility.

Jones Island lies North from Sidney Spit two-thirds of a mile, with a clear passage between. *The Little Group* lie W. by N. two-thirds of a mile from Jones Island. They consist of four rocky islets, bare of trees, and connected by reefs. *Bird Islet*, lying on the eastern side of Shute Passage, and N.N.W. two-thirds of a mile from the North point of Jones Island, is about 6 feet above high water.

Coal Island, which helps to form the western side of Shute Passage, lies close off the N.E. extreme of the Saanich Peninsula, and immediately at the entrance of Shoal Harbour. It is a mile in extent, and thickly wooded, and its eastern and northern shores are free from danger.

A rock, which covers at quarter flood, lies W.N.W. 4 cables from the

East end of the group, and S.S.E. nearly two-thirds of a mile from the East point of the island. A small patch with 4 fathoms over it, and marked by kelp, lies N.E. one mile from the East point of Coal Island, N.N.W. $\frac{1}{2}$ W., more than three-quarters of a mile from Bird Islet, and one-third of a mile S.W. from Yellow Islet.

Celia Reef must also be avoided. The least water found on it is 9 feet; it is marked by kelp, and lies North two-thirds of a mile from the North point of Pym Island. *Knapp and Pym Islands* are small and wooded, lying between Piers and Coal Islands. Having passed westward between these islands a vessel is fairly in Satellite Channel.

Moresby Passage.—After leaving the northern end of Sidney Island, the directions for Moresby Passage are the same as those already given for Shute Passage, until abreast the East point of Coal Island. From a berth about one-third of a mile off this point, the direct course through the passage is North by West for two miles, or until near its northern entrance, which lies between Portland and Moresby Islands. This space is wide, and free from danger; it then becomes somewhat intricate, from the Turnbull Reef and Canoe Rocks, which extend off both these islands, narrowing the channel at its northern entrance to little over one-third of a mile.

Off the eastern point of Portland Island are three rocky islets, *the Sisters*, which extend to a distance of nearly 2 cables. They are about 25 feet high, have a few stunted cedar trees on their summits, are joined by reefs, and will be immediately recognised either from the northward or southward. Eastward from the Sisters, at a distance of more than one-third of a mile, extends the *Turnbull Reef*. Two fathoms is the least water found on its outer edge, and it is marked by a heavy bank of kelp. *Canoe Rocks* is a dangerous ledge, extending W. $\frac{1}{2}$ N., nearly half a mile from Reef Point, the north-west point of Moresby Island; the outer rock of this ledge covers a little after half flood, and is not marked by kelp, though kelp grows between the point and the rock. When both or either of these dangers are visible, the passage is very easy.

Prevost Passage lies between Moresby Island and the group of smaller islands to the southward of it, and leads by the Shute or Moresby Passages into Satellite Channel. To a vessel passing up the main stream of Haro Strait, and bound for the Swanson Channel, the easiest and most direct route is between Stuart and Moresby Islands; but circumstances of wind or tide may render it convenient to take the Prevost Passage.

The dangers to be avoided in Prevost Passage are the *Arachne* and *Cooper Reefs*. The *Arachne* lies nearly in the centre of the passage, in a direct line between Fairfax Point, the S.E. point of Moresby Island, and Tom Point, the East point of Gooch Island. This reef covers at quarter flood, and has a good deal of kelp on its N.W. edge, which, however, is frequently hidden by the tide.

Cooper Reef, lying half a mile N. by W. of Tom Point of Gooch Island, is marked by kelp, and uncovers at half ebb.

Yellow Island, a small bare island S.W. by W. nearly one mile from Fairfax Point, may be passed on either side. The North side is recommended; if passing on its South side, take care to avoid the small patch of 4 fathoms marked with kelp, mentioned in page 295 as lying S.W., a third of a mile from it.

SATELLITE CHANNEL is formed by Admiral Island on the North, and Moresby, Portland, and Piers Islands, and the northern shore of Saanich Peninsula on the South. It leads to Saanich Inlet, Cowitchin Harbour, and by the Sansum Narrows to Stuart Channel. It is a fair deep passage, with but few dangers, which are not always visible; among these are Shute Reef and Patey Rock.

Shute Reef is a ledge less than half a cable in extent, with two rocks, one of which dries 8 feet at low water, its vicinity being marked by kelp. It lies W.S.W. two-thirds of a mile from Harry Point, the North point of Piers Island, and N. $\frac{1}{2}$ E. nearly 3 cables from Arbutus, a small islet lying half a mile westward of Piers Island.

Patey Rock, at the western end of Satellite Channel, is a single rock, uncovering at half tide with kelp round it, and is in the way of vessels working into Saanich Inlet or Cowitchin Harbour. It bears from Hatch Point, the westernmost point of Saanich Inlet, N.E. by N., two-thirds of a mile, from *Coal Point*, a remarkable nob point, the South extreme of Deep Cove, N.W. by W. $\frac{1}{2}$ W. nearly 2 miles, and from Arbutus Island S.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles.

Cecil Rock, lying S.E. $\frac{1}{2}$ S. a quarter of a mile from the S.W. point of Russell Island at the entrance of Fulford Harbour, must also be avoided in working up Satellite Channel. *Boatswain Bank*, on the western side of the channel, affords good anchorage in from 4 to 9 fathoms, sandy bottom. It extends three-quarters of a mile from the Vancouver shore, between Cherry and Hatch Points.

SAANICH INLET is a deep indentation running in a nearly S.S.E. direction for 14 miles, carrying deep water to its head, which terminates in a narrow creek within 4 miles of Esquimalt Harbour. The inlet forms a peninsula of the S.E. portion of Vancouver Island of about 20 miles in a N.N.W. and S.S.E. direction, and varying in breadth from 8 miles at its southern part to 3 miles at its northern.

On the southern coast of this peninsula are the harbours of Esquimalt and Victoria, in the neighbourhood of which for some 5 miles the country is pretty thickly wooded, its prevailing features lake and mountain, with, however, some considerable tracts of clear and fertile land; the northern portion for about 10 miles contains some of the best agricultural land in Vancouver Island, the coast line is fringed with pine forests, but in the centre it is clear

prairie or oak land, and much of it under cultivation; seams of coal have also been found.

Off the eastern or peninsula side of the inlet there are some good anchorages, the centre being for the most part deep. Immediately southward of James Point, the north-western point of the peninsula, is Deep Cove, but no convenient anchorage.

Norris Rock, awash at half tide, lies S.W. by S. 2 cables from James Point, with 12 fathoms between it and the point. Vessels rounding this point should give it a berth of half a mile.

COWITCHIN HARBOUR is 4 miles westward of *Cape Keppel*, the southern extreme of Admiral Island; *Separation Point*, the western point of entrance of Sansum Narrows, forms its northern entrance point, and is somewhat remarkable, being the termination of a high stony ridge dropping suddenly, and running off as a low sharp point to the southward. Cowitchin runs to the westward of this point for $2\frac{1}{2}$ miles, and the general depth of water in it is 30 fathoms, which shoals suddenly as the flat, which dries off for more than half a mile from the head of the harbour, is approached. But for the large tract of good land contained in the valley of Cowitchin, the port would scarcely be deserving of notice, and certainly the term of bay is more applicable to it than that of harbour. The only convenient anchorage to be obtained is in *Saug Creek*, on the North side of the harbour, or off the outer village on the South side, a mile within the entrance.

Sansum Narrows run in a general northerly direction between Vancouver and Admiral Islands for a distance of 6 miles, when they lead into Stuart Channel. Their average breadth is about half a mile, but at their narrowest part abreast Bold Bluff on the Admiral Island shore, $2\frac{1}{2}$ miles above Separation Point, they are contracted to a third of a mile. The high land on either side renders the wind generally very unsteady; it cannot be recommended except for steamers or coasting vessels.

Entering Sansum Narrows from the southward, a kelp patch, with 9 feet on it, must be avoided on the Admiral Island shore. It lies 2 cables S.S.W. from a small islet close to the coast, nearly a mile E. by N. from Separation Point, and S.E. $\frac{1}{2}$ S. half a mile from Entrance Point.

Another rocky patch extends nearly a cable off shore from the eastern side of the Narrows, three-quarters of a mile north-westward of Entrance Point. *Burial Islet*, a small spot used as an Indian burying-place, lies on the eastern side of the Narrows, $1\frac{1}{2}$ mile above Separation Point.

Burgoyne Bay.—*Bold Bluff*, a smooth headland of bare rock, is steep-to; the channel here is scarcely a third of a mile across. Burgoyne Bay, the entrance to which is half a mile eastward of Bold Bluff, is a narrow and rather deep indentation, terminating in a sandy head. There is no bottom in the bay under 30 fathoms, until within 2 cables of its head, when

the water shoals suddenly from 10 to 4 fathoms. Anchorage may be had if necessary.

Maple Bay.—From Grave Point the Narrows take a north-westerly direction, and at a distance of little more than a mile on the Vancouver Island shore is Maple Bay. *Boulder*, the southern entrance point, is remarkable from a large boulder stone standing at its low water extreme. Although an inviting looking bay, the water is too deep for comfortable anchorage. *Bird's-eye Cove*, which runs in a southerly direction for nearly a mile from Boulder Point, affords fair anchorage in 8 to 10 fathoms. A shoal patch, with 2 fathoms, extends nearly a cable off the West side of the cove.

STUART CHANNEL.—Sansum Narrows extend $1\frac{1}{2}$ mile northward of Maple Bay, when they lead into Stuart Channel, the westernmost of the ship passages which wash the eastern side of Vancouver Island. The western side of this channel is formed by the shores of that island; its eastern by the Coasts of Admiral and Thetis Islands. It runs in a general N.W. direction for nearly 20 miles, when it joins the Dodd Narrows below Nanaimo. The principal dangers are the North and Escape Reefs, White Rock, and Danger Reef.

On the Western or Vancouver Island shore there are some good harbours, viz., Osborn Bay, Horse-shoe Bay, Oyster Harbour, and Chemainos Bay; on the eastern side there are also some anchorages, Telegraph and Preedy harbours on the western, and Clam Bay on the eastern side of Thetis Island.

Osborn Bay, the southernmost anchorage on the western side of Stuart Channel, may be known by the Shoal Islands, a low wooded group, connected at low water by reefs and mud banks, and which form the northern side of the bay. The bay affords good anchorage, sheltered from the prevailing winds, from the westward and S.E.

The coast north-westward of Osborn Bay, between it and Horse-shoe Bay, is shoal for some distance off, deepening suddenly when half a mile from the shore, and vessels should by no means approach it within that distance.

Horse-Shoe Bay, 4 miles north-westward of Osborn Bay, will be known by a rather remarkable sharp point (*Bare Point*) bare at its extreme, which forms its eastern entrance. There is convenient anchorage for small vessels within a quarter of a mile of its head. The *Bird Reef*, a rocky ledge uncovering at half tide, extends a cable's length from the shore, north-westward of the western point of entrance, and bears from Bare Point W. by S. half a mile.

Oyster Harbour is 4 miles W.N.W. from Horse-shoe Bay, the intervening coast being free from danger; the harbour runs in the same direction for 4 miles, is nearly a mile wide at the entrance, narrowing gradually within. Entering from the northward, Coffin Islet should be given a berth of 2 cables; there are no other dangers which are not visible. At low water the

oyster beds dry for 2 cables off the South shore. A good anchorage for a large vessel is a mile within the entrance.

It is high water at full and change in Oyster Harbour at 6^h 30^m p.m., and the rise is 10 feet.

Chemainos Bay is 2½ miles northward of the entrance of Oyster Harbour, and W. by S. the same distance from Reef Point, the N.W. point of Thetis Island. It is open and cannot be recommended.

Yellow Point, bare and grassy at its extreme, is the North point of Chemainos Bay. From thence to Round Island, at the southern entrance of Dodd Narrows, and bearing N.W. 5 miles, the coast is bold and free from danger.

From the northern entrance of Sansum Narrows to North Reef, a distance of 4 miles, there are no dangers, and both shores may be approached boldly in working up.

North Reef is a sandstone ledge running in a north-westerly and south-easterly direction, as all the reefs in this channel do. It bears from the S.E. point of Tent Island S. ½ E. half a mile, with a clear channel between of 26 fathoms. Its summit is just awash at high water, and therefore easily avoided.

Tent Island, narrow, and two-thirds of a mile long, lies off the South extreme of Kuper Island, and a cable's length off its S.E. end are two remarkable worn sandstone rocks 8 or 10 feet above water; the breadth of the passage between them and North Reef is one-third of a mile. N.E. ½ E. nearly 2 cables from the south-east end of Tent, is a rock which uncovers 2 feet.

Escape Reef, at 2 miles N.W. by W. ½ W. from North Reef, is a dangerous patch, nearly one-third of a mile in extent, in a W.N.W. and E.S.E. direction, which covers at quarter flood, and has no kelp to mark its position. It lies nearly half a mile from the West shore of Kuper Island; there is a deep channel a third of a mile wide between it and Kuper Island.

Alarm Rock is scarcely in the track of vessels working up Stuart Channel. It lies nearly 2 cables S. by W. from the S.E. point of Hudson Island, the south-easternmost of the group of islands, which lie off the western sides of Kuper and Thetis Islands. It just covers at high water. *False Rock* lies N.W. by W. ½ W. 4 cables from Scott Island, the north-westward of the group just mentioned, and covers at half flood.

White Rock, about 30 yards long, and 15 feet above high water, lies N.N.W., one mile from Reef Point, the north-west extreme of Thetis Island. This rock has a whitish appearance, and is readily distinguished from a vessel's deck at 2 or 3 miles. It may be passed within 2 cables' lengths.

Ragged Island, a low rocky islet, with a few trees on it, lies a third of a

mile northward of the North end of Thetis Island, with a passage of 12 fathoms between them.

DANGER REEF covers a space of 3 cables almost in the centre of the channel. A small portion of it is generally awash at high water, at which time it is difficult to make out until within a short distance of it. White Rock bears from it S.E. by S. distant one mile; and Tree Islet N.E. $\frac{1}{2}$ N., two-thirds of a mile.

In passing through Stuart channel, there is a clear passage of $1\frac{1}{4}$ mile between Danger Reef and the Vancouver Island shore, and going either up or down the channel, White Rock kept on with the low neck (a gap between the two summits of Thetis Island) leads well to the westward of the reef. There is a clear passage of three-quarters of a mile between White Rock and Danger Reef, and of more than half a mile between the reef and Tree Island, with a depth of over 30 fathoms.

Vesuvius Bay, on the western side of Admiral Island, immediately opposite Osborn Bay, has deep water, but shoals suddenly at its head. It is not recommended as an anchorage. There is also anchorage inside *Idol Islet* in Houston Passage.

Grappler Reef, on the eastern side of Houston Passage, is a cable in extent, and uncovers at very low water. It lies a quarter of a mile off the N.W. end of Admiral Island, with Southey Point bearing N.N.E. half a mile; there are 5 fathoms between it and the shore of the island.

TELEGRAPH HARBOUR, on the West side of Kuper Island, is a snug anchorage, and its entrance is between Hudson Island and Active Point, which are half a mile apart. Entering from the southward, Escape Reef must be avoided. If passing inside the reef, the shore of the island should be kept aboard within a quarter of a mile: if outside or westward, then the Sandstone Rocks should be kept open of the S.E. point of Tent Island, until Upright Cliff of Kuper Island bears N.E.; when a vessel will be well to the northward of it, and may steer for the entrance of the harbour, which is free from danger, with the exception of Alarm Reef, extending from the S.E. point of Hudson Island.

Preedy Harbour is separated from the one just described by a group of small islands and reefs; its entrance is to the northward of them, between Scott Island and Crescent Point of Thetis Island, and is a third of a mile in breadth; in entering the Thetis Island shore should be kept aboard to avoid *False Rock*, a patch which covers at half tide, and lies W.N.W. nearly 4 cables from the West end of Scott Island, and S.W. $\frac{1}{2}$ S. half a mile from Crescent Point.

SWANSON CHANNEL leads from the Haro Strait to the north-westward between Admiral Island on the West and Pender Island on the East; passing eastward of Prevost Island it enters the Active Pass between Galiano and

Mayne Islands, thence into the Strait of Georgia; northward of Active Pass it connects with Trincomalie Channel.

ADMIRAL ISLAND, separating the Stuart from the Trincomalie and Swanson Channels, is of considerable extent, being nearly 15 miles in length N.W. and S.E., and varying in breadth from 2 miles at its northern end to 6 at its southern. It has two good ports, Fulford Harbour on its south-east, and Ganges Harbour on its eastern side. The southern portion of the island (which is a peninsula formed by the indentations of Fulford Harbour and Burgoyne Bay, a valley separating the heads of these ports) is composed of a lofty ridge of mountains over 2,000 feet in height, rising abruptly from all sides.

Immediately northward of the valley and over Burgoyne Bay on its western side *Mount Baynes* rises to an elevation of nearly 2,000 feet, and is very remarkable; its southern face being a perpendicular precipice, visible a long distance from the southward or eastward. The *Otter Range*, of somewhat less elevation, rises northward of Mount Baynes, from whence the island slopes away in a wedge shape, its northern termination, Southey Point, being a sharp extreme. The island is for the most part thickly wooded.

Fulford Harbour penetrates the S.E. side of Admiral Island in a W.N.W. direction for $2\frac{1}{2}$ miles. At its entrance is Russell Island, between which and Isabella Point, the western point of the harbour, is the best passage in.

Cecil Rock, with 2 fathoms on it, lies S.E. $\frac{1}{2}$ S. a quarter of a mile from the S.W. point of the island. The breadth of the southern entrance is two-thirds of a mile, with a depth of 20 fathoms until abreast North Rock, which is a small rocky islet lying close off the North point of the harbour; a rock which covers at quarter flood lies West of it 2 cables length, and more than $1\frac{1}{2}$ cable from the shore, so that strangers entering should keep rather to the southward of mid-channel until past it. Mount Baynes appears very remarkable from the harbour, rising immediately over its head almost as a perpendicular cliff. The northern passage into the harbour between Russell Island and Eleanor Point, though in places not more than one-third of a mile in breadth, is a safe channel of 14 to 18 fathoms water. *Louisa Rock*, with only one fathom on it, is the only danger; it lies 2 cables from the northern or Admiral Island shore.

GANGES HARBOUR is a safe and commodious port for vessels of any description or size. Its southern entrance, which is in the Swanson Channel lies between Admiral and Prevost Islands, and has no dangers which are not visible. In entering, the Channel Islets may be passed on either side; they are two small wooded islands, $1\frac{1}{2}$ mile within Beaver Point, and 2 cables from the shore of Admiral Island.

Liddell Point, the S.W. extreme of Prevost Island, and the northern

entrance point of the harbour, has an uncovering reef extending $1\frac{1}{2}$ cable eastward of it. The *Acland Islands*, two in number, lie to the westward of the point along the shore of Prevost Island, between which and them there is no ship channel. The fair channel into the harbour is between the Channel and Acland Islands, the breadth between them is half a mile, the depth 30 fathoms; having passed these islands the harbour is nearly $1\frac{1}{2}$ mile wide, and the general depth for 2 miles, 20 fathoms.

There are but few dangers in working into the harbour, and they are easily avoided. A rocky patch with one fathom on it lies W. $\frac{1}{4}$ N. 2 cables from the West point of the westernmost Acland Island, and nearly the same distance off shore. The one fathom patch is more in the track of vessels; it lies with the southernmost Channel Islet bearing E. by S. $\frac{1}{4}$ S. nearly 2 miles, and Peile Point, the N.W. extreme of Prevost Island, North 2 miles, and is half a mile from the southern or Admiral Island side of the harbour; there is a clear passage of half a mile southward of the patch in 14 fathoms. To the northward of it the passage is a mile wide.

A vessel may anchor as soon as 10 or 12 fathoms is found. The *Chain Islands* are a group of 6 or 7 low narrow islets connected by reefs, extending from the head of the harbour in an E.S.E. direction for $1\frac{1}{2}$ mile. To the southward of these islands the ground is clear, but to the northward of them are scattered reefs, and a vessel is not recommended to anchor on that side within the outermost island.

Captain Passage also leads into Ganges Harbour, to the northward of Prevost Island. It is a clear deep passage, nearly half a mile wide, with depths from 30 to 40 fathoms, and vessels from the northward intending to enter should always use it. There is only one danger, which is well inside Ganges Harbour, and is almost equally in the track of vessels working up by the southern passage; it is a small patch of 2 fathoms lying $3\frac{1}{2}$ cables S.W. by W. from the western entrance point of Long Harbour.

Long Harbour may be almost considered as part of Ganges Harbour. It is a long, narrow creek, its general breadth being 2 to 3 cables, running parallel with and eastward of the latter for 3 miles. Its entrance is between two sloping, rocky points, similar to each other on the North side of Captain passage. At a quarter of a mile within the entrance is a high, bare islet, which must be passed on its South side; one mile within is another island, somewhat similar, which may be passed on either side. At the head of the creek is a snug place for a ship to repair, &c., but as a harbour it is only adapted to steamers or coasters, and, with the good and easy anchorage of Ganges Harbour so close, there would appear to be no reason to recommend this contracted and inconvenient one.

PREVOST ISLAND, lying in the centre of Swanson Channel, is moderately high, thickly wooded, and of an irregular shape. It is 3 miles long, in a N.W. and S.E. direction, $1\frac{1}{2}$ mile in breadth, and on its southern and

western sides it is indented by several bays and creeks; its northern side is almost a straight cliffy shore.

Ellen Bay, on the S.E. side of Prevost, between Liddell and Red Islet Points, is three-quarters of a mile deep, by one-third in breadth, and affords fair anchorage with all but south-easterly winds in 10 fathoms mud. *Annette* and *Glenthorne Creeks*, on the western or Ganges Harbour side, are curious, narrow indentations, running into the island for a mile in an E. by S. direction. *James Bay*, in the N.W. side of the island, and on the South side of Captain Passage, offers anchorage in 10 fathoms for one or two vessels of moderate size with southerly winds. *Hawkins Island* is a small rocky islet, with a few bushes on it, lying close off a remarkable white shell-beach on the N.E. side of Prevost Island. From 2 to 3½ cables W. ½ N. of its north-western point, are the *Charles Rocks*, three smooth-topped rocks, not marked by kelp, and uncovering towards low water.

ACTIVE PASS.—From Discovery Island in the southern entrance of Haro channel, to the sand heads of Fraser River, by the Active Pass, is just 40 miles, and the line is almost a straight one. By adopting this route, not only the most dangerous and inconvenient part of the Haro Strait is avoided, viz. its northern entrance abreast of the East point of Saturna Island and Patos Island, where the tides are strong and apt to set a vessel down Rosario Strait, or over on the eastern shore, but a distance of nearly 10 miles is saved.

After entering Swanson Channel (page 301) between Admiral and Pender Islands, steer to the eastward of Prevost Island. From Portlock Point, the south-eastern bluff of Prevost, the entrance of the pass bears N. by W. ½ W. 1½ mile. The southern point of entrance, Helen Point, is low, bare, and of a yellowish colour; over its northern side rise the high, stony hills, on the southern side of Galiano Island. The entrance itself does not become very apparent until it is approached within a mile. If overtaken by night, or waiting for tide, Otter Bay, on the West side of Pender Island, is a good stopping-place; it is a mile North of Mouatt Point, and 2½ miles E.N.E. of the Channel Islands in Ganges Harbour; a very fair anchorage is to be had in the centre of the bay, in 8 fathoms, and no dangers. Ellen Bay in Prevost Island might also be used, but the former is preferred. There are few dangers to be avoided in passing from Swanson Channel through the pass; the principal of them is the Enterprise Reef, two dangerous patches which lie off the West side of Mayne Island.

In passing up Swanson Channel, keep Pelorus Point, the eastern extreme of Moresby Island, open of Mouatt Point, the western extreme of Pender Island. These two points, just touching, lead very close on to the reef, but open they clear it 1½ cable. If coming out of Navy Channel, a vessel should keep over for Prevost Island until these marks are open. When Helen Point bears N. by E., the reef is cleared, and the entrance may be steered

for. There is a passage inside Enterprise Reef which may be taken when both the kelp patches can be seen.

On the western side of Swanson Channel, the uncovering rock, $1\frac{1}{2}$ cable eastward of Liddell Point, must be avoided, and the points northward of it, Red and Bright Islands, should be given a berth of a cable.

Active Pass runs in an E.N.E. direction for $1\frac{1}{2}$ mile, and then turns N. for the same distance, fairly into the Strait of Georgia. The average breadth of the channel is about one-third of a mile, and its general depth about 20 fathoms. There are no hidden dangers, but the great strength of the tides, together with the absence of steady winds, renders it unfit for sailing vessels, unless, indeed, small coasters; for steamers it is an excellent channel, and a vessel commanding a speed of 8 knots may take it at any time without fear.*

A quarter of a mile within the southern entrance, and very close off the northern shore, is a rock which uncovers at half tide. This is the only danger, and cannot be said to be in the track of vessels; in passing to the westward, however, against the flood, a vessel should keep rather on the southern side, as the tides set over towards this rock.

Miners Bay, on the South side of Active Pass, where it takes the sharp turn to the northward, affords anchorage, if necessary; but a vessel must go close in to get 12 fathoms, and then she is barely out of the whirl of the tide.

In entering or passing out of the northern entrance, the point of Gossip Island, on the West, and also Georgia Point, on the East, should be given a good berth; indeed, the best directions which can be given are to pass through in mid-channel. From thence the sand heads of Fraser River bear N. by W. $\frac{1}{4}$ W. distant 11 miles. The sand head buoys are visible at 2 or 3 miles.

Tides.—The flood-tide in Active Pass sets from West to East, or from the Swanson Channel into the Strait of Georgia; and the ebb, in the contrary direction.

The velocity during springs is sometimes 7 knots; at ordinary tides, from 3 to 5. In the northern entrance there is sometimes a heavy tide ripple, caused by a patch of 7 and 9 fathoms, and by the meeting of the tide through the pass with that in the strait.

* H.M.S. *Termagant* passing through Active Pass in July, 1860, ran on to Laura Point, on the South side, from refusing to answer her helm in making the turn to the northward, the tide at the time favourable, and running about 4 knots. H.M.S. *Plumper* and *Alert* were ahead and astern of her at the time. The *Termagant's* draught was 18 feet, and she sat 5 feet by the stern: an under current striking her heel was probably the cause. H.M. steam ships of equal size and greater length had passed through previously on several occasions.

TRINCOMALIE CHANNEL commences at Active Pass, from the southern entrance of which its general direction is W.N.W. for 24 miles, when it enters the Dodd Narrows.

Like all the inner channels already described, this one must be classed as essentially a channel for steamers or coasters; it can only be used with advantage by vessels bound to the eastern ports of Vancouver Island below Nanaimo, or by such as choose to enter Nanaimo itself by that contracted pass the Dodd Narrows.

The eastern side of the channel is formed by the long narrow islands of Galiano and Valdes, and the western by Admiral, Kuper, and Thetis Islands. Some smaller islands are scattered over it, and there are also several rocks which require to be known and avoided, nevertheless, with the assistance of the chart, and these directions, it is a desirable and safe channel for the class of vessels before mentioned. The general depth of water is not inconvenient for anchorage if necessary, as it rarely exceeds 30 fathoms, and from 12 to 18 fathoms can generally be found at a convenient distance from the shore. Montague Harbour, on the western side of Galiano Island, is a good stopping place, also Clam Bay on the East side of Thetis Island.

There are two passes leading into the Strait of Georgia, viz., the Portier and Gabriola; both are intricate and dangerous unless to those perfectly acquainted with them, and the tides are so strong, and varying in their set, that they cannot be said to be applicable to the general purposes of navigation, and few vessels would be justified in using them, unless in cases of emergency.

Montague Harbour, is formed between the S.W. side of Galiano Island, and Parker Island, and its entrance, between Phillimore Point and the small island of Julia, is $1\frac{3}{4}$ mile W.N.W. from the West entrance of Active Pass. The entrance is but little over a cable in breadth, but has deep water, and is free from danger. Immediately within the points it widens out to a quarter of a mile, and anchorage may be obtained in 8 to 10 fathoms in the arm which leads to the harbour. There is a narrow passage to the north-westward from this harbour into the Trincomalie Channel.

Several smaller islands extend W.N.W. of Parker Island, viz., *Sphinx*, *Charles*, *Wise*, and *Twin Islands*, the latter two rather remarkable rocky islets about 30 feet high.

Atkins Reef lies on the western side of Trincomalie Channel, one-third of a mile from the shore of Admiral Island, and in the track of vessels working up or down. It is a cable in extent, and covers at 4 feet flood, its neighbourhood being marked by kelp, which, however, is rarely seen when there is any ripple on the water. The reef bears from Peile Point the N.W. end of Prevost Island W. by N. $\frac{1}{2}$ N. $3\frac{1}{4}$ miles; from the Twin Islands S. $\frac{1}{2}$ E. $1\frac{1}{2}$ mile.

Walker Hook is formed by a peninsula or tongue of land projecting from Admiral Island, 4 miles westward of the Captain Passage. On its south-east side is fair anchorage for small vessels in 6 fathoms, but a shoal patch marked by kelp lies 2 cables eastward of the south-east point of the peninsula.

Governor Rock is a dangerous rocky patch lying almost in the centre of Trincomalie Channel. It has 4 feet on it at low water, is about half a cable in extent, and though kelp grows on it, yet it is very difficult to make out until quite close to. From Twin Island it bears W. $\frac{1}{2}$ S. $1\frac{1}{2}$ mile; from the S.E. point of Walker Hook N.W. by N. $1\frac{1}{2}$ mile; and from Quadra Hill S.S.W. This hill cannot be mistaken; it rises from the centre of Galiano Island to the height of 746 feet, and a remarkable white basaltic cliff will be seen on the coast immediately southward of it.

Walker Rock lies North two-thirds of a mile from Governor Rock, and is scarcely less dangerous, except that it uncovers at half ebb. From Twin Island it bears W. by N. $\frac{1}{2}$ N. $1\frac{1}{2}$ mile, from Quadra Hill S.W. by S., and is distant two-thirds of a mile from the shore of Galiano Island.

These two rocks are the principal dangers to be avoided in the Trincomalie Channel; they are both steep-to, and may be passed if necessary at half a cable's length.

Directions.—In passing up or down Trincomalie Channel, vessels may either take the passage southward of Governor Rock, or that between it and Walker Rock, or northward of the latter. If taking the southern passage, after having cleared Atkins Reef, Walker Hook, and the shore of Admiral Island, which is bold, should be kept aboard within half a mile, until Quadra Hill bears N.E., when they will be to the westward of both rocks, and may steer over towards the S.E. end of Narrow Island, giving it a berth of at least a quarter of a mile, as a reef extends off it.

If passing northward of Walker Rock when bound westward up the channel, keep Parker and Wise Islands aboard within half a mile; there are no dangers off them. When abreast Twin Island, which may be passed within two cables, haul in to the northward until Mount Sutil, on the southern end of Galiano Island is well open northward of Twin, or until the mountain is on with Charles Island. Run up with these marks on astern (which will lead well inside Walker Rock) until Quadra Hill bears N.E. by E.

Coming down Trincomalie Channel, and desiring to pass northward of Walker Rock, keep over on the Galiano Island shore until the N.E. point of Thetis Island is shut in by the South point of Hall Island. As long as these points are not opened a vessel will be northward of the rock, and when Quadra Hill bears North, she will be well eastward of both it and the Governor Rock.

HOUSTON PASSAGE leads from the Trincomalie into Stuart Channel.

Vessels intending to take it had better pass up southward, or inside the Governor Rock. The entrance is between the N.E. point of Admiral Island and Narrow and Secretary Islands; there are no dangers.

Southey Point is the sharp northern extreme of Admiral Island, and may be approached to a cable's length to the northward. At half a mile S.S.W. of it is the Grappler Reef described in page 301; round it Houston Passage turns abruptly to the southward, and Stuart Channel may be entered either by the main passage between North Reef and Admiral Island, or if necessary, between North Reef and Tent Island. Give North Reef a moderate berth, as a shoal ridge of rocks extends one-third of a mile off its N.W. and S.W. ends (page 300).

PORTIER PASS separates Galiano from Valdes Island, and is the first outlet into the Strait of Georgia, northward of Active Pass, from which it is distant 14 miles. The pass, though short (not exceeding a mile from its southern entrance until fairly in the strait) is narrow, and is rendered still more so by sunken rocks on its western side. The tides are very strong, running from 4 to 7 knots, and overfalls and whirling eddies are always to be met in the northern entrance. No vessel but a steamer commanding a speed of 8 knots is recommended to take it unless in a case of emergency. The first danger in the southern entrance is *Black Rock*, just awash at high water. It is on the western side of the pass E.S.E. $1\frac{1}{2}$ cable from Native Point, the N.W. entrance point, and is easily avoided.

The second and principal danger is the *Virago Rock*, almost in the centre of the channel, but rather on the western side. It only uncovers at low tides, and bears from Native Point E. by N. $\frac{1}{2}$ N. 2 cables, and from Race Point, the centre projecting point on the East side of the pass S.W. by W. a little over 2 cables, which is the least breadth of the passage. The third danger is a 2-fathom rocky patch, extending from one of the outer East points of the pass, bearing from Race Point N.N.E. $\frac{1}{2}$ E., a third of a mile, and from Tongue Point, the outer East point, W. by N. $\frac{3}{4}$ N. 3 cables' lengths; this patch is covered with kelp, which is generally visible.

Directions.—At any stage of the flood stream a steam-vessel acquainted with the channel might pass out into the Strait of Georgia with facility. The eastern shore should be always kept aboard within a cable's length until beyond Race Point, which should be passed close, after which a vessel with the flood stream should make for Canoe Islet, a bare yellow rock about 20 feet high N.N.W. two-thirds of a mile distant, in order to clear the two-fathom patch. Canoe Islet is clear of danger on its western side, but its eastern should not be approached within 3 cables' lengths.

In passing out of the channel with the ebb-tide, the great danger to be avoided is the violence of the stream setting against and round Race Point, which, if a vessel have not sufficient power to steer, will either take her on the port bow and set her on the point, or, which is more probable, on the

starboard, and set her on Virago Rock, as was the case on one occasion with H.M. steam-vessel of that name.

Entering Trincomalie Channel from the Strait of Georgia by this pass, a vessel should keep a third of a mile eastward of Canoe Islet, and then steer for Race Point, due allowance being made with the flood for the 2-fathom patch; if with the ebb, Race Point should be kept close aboard to avoid being set on Virago Rock, and having passed the point, hug the eastern shore, which is clear of danger. The rule on all occasions should be to avoid the western shore; the great strength of the tide ceases immediately on clearing the entrance points either way. From the Strait of Georgia the pass is always easily recognized at the distance of several miles, by the gap formed by its sloping wooded entrance points terminating in two low extremes from most points of view overlapping each other. Steer for the entrance on a bearing about S. by W.

Tides.—The flood tide runs from Trincomalie Channel to the northward into the Strait of Georgia, and the ebb in the contrary direction. The ebb stream commences from one hour to one hour and a half before it is high water by the shore, and runs for one hour after low water, or from 7 to 8 hours. The high water at the full and change of the moon occurs about 6 p.m., but is not very regular.

CLAM BAY is on the eastern sides of Thetis and Kuper Islands, opposite to Portier Pass. The continuation of the bay separates these two islands at high water, when there is a boat channel into Telegraph Harbour (p. 301), on their western side. A remarkable white spit point of broken clam shells, seen from a long distance, forms the southern entrance point of the bay; immediately southward of it is a considerable native lodge. *Leech Island*, off the northern point, is a small wooded islet. *Centre Reef*, with 7 feet on it, and marked by kelp, lies almost in the centre of the entrance.

The best passage into Clam Bay from the eastward is northward of Narrow, Secretary, and Indian islands, between them and Hall Island. After passing Indian Island steer in for White Spit, giving it a berth of a cable, and anchor in 6 fathoms in the centre of the bay, the spit bearing East, and Leech Island N.N.W.

There is fair anchorage on the western side of Valdes Island, 2 miles above Portier Pass, immediately off a yellow cliff. Eight fathoms, sandy bottom, will be found with the cliff bearing N.W. by N. distant a quarter of a mile.

DODD NARROWS may be said to commence above Round Island (page 300), although the narrowest part is a mile distant from it. To small vessels or steamers of sufficient power that obey their helm quickly, this narrow pass offers no dangers. The strength of the tide at its greatest rush is above 8 knots, the least depth of water 7 fathoms, and the narrowest part of the channel is 80 yards wide; but this is for a short distance,

and the pass being nearly straight, a vessel is carried through in a few moments.

If bound through Dodd Narrows, and having to wait for tide, there is fair anchorage with but little tide, westward of Round Island in 6 fathoms, mid-way between it and the shore.

In proceeding for Dodd Narrows from abreast Portier Pass, the mid-channel course is W.N.W. for about 3 miles, or until Ragged Island and Reef Point of Thetis Island are in one bearing S.W. by S.

The most direct course is northward of Danger Reef, between it and Tree Island; the latter is a small round wooded islet lying off the South end of De Courcy Islands. This passage is two-thirds of a mile wide, with a depth of 25 to 30 fathoms.

Danger Reef (page 301) should not be approached within a cable where there are 9 fathoms; if the reef should not be seen, it is recommended to pass Tree Island at the distance of a quarter of a mile. There is deep water between it and De Courcy Islands.

The passage between White Rock and Danger Reef is likewise a very good one; it is three-quarters of a mile wide, with a depth of 20 to 30 fathoms.

In passing up, keep on the starboard or eastern side of Round Island at a convenient distance; the only directions necessary after this are to keep in mid-channel, and to attend the steerage quickly and carefully. Immediately through the Narrows the tide ceases, and a vessel will be in Northumberland Channel, a fine wide passage leading to, and only 5 miles from, the anchorage at Nanaimo.

In taking the Narrows from the northward, be careful not to mistake the False Narrows, which are on the port or northern side of Northumberland Channel, and are much wider than the real pass, but nearly dry at low water. The Dodd Narrows are not so easy to pass from the North as from the South, as in the former case the slight bend that has to be made must be made immediately on entering the narrow part. The tides should be studied in passing either way. It is not recommended to attempt it with the full rush of the stream; an hour before or after low water there is no difficulty to a steam-vessel.

It is high water in the Narrows on full and change days at 3^h 30^m p.m., and low water at 9^h 30^m a.m., and on those days the flood stream commences at low water, and runs about seven hours. The first of the flood is the best time to pass the Narrows. Vessels leaving Nanaimo and intending to pass down, should be at the Narrows an hour before high or low water, as the tides are nearly an hour earlier at the Narrows.

PYLADES CHANNEL.—The De Courcy Islands are a group extending 4½ miles in an E.S.E. direction from Mudge Island, which separates the False from Dodd Narrows, and on their northern side, between them and

Valdes Island, is Pylades Channel, which leads by the Gabriola Pass into the Strait of Georgia, as well as to the entrance of the False Narrows. The average breadth of the channel is a mile, with a depth of 35 fathoms, and at its head, near the entrance to the False Narrows, is good anchorage in 9 fathoms, convenient for vessels intending to take the Gabriola Pass and waiting for tide.

False Narrows are full of kelp, and shoal at low water, affording only a boat passage into Northumberland Channel. The passages between the De Courcy Islands are deep and navigable; that between the North and Middle Island is half a mile wide, and free from danger. The narrow pass between the Middle and South Island is scarcely a cable wide, but has a depth of 5 fathoms.

GABRIOLA PASS, between the South end of Gabriola Island and the North end of Valdes Island, is not recommended, unless for coasting vessels knowing the locality, or steamers, if necessary, for it is a narrow and intricate channel, something of the same character as Dodd Narrows, except that it is a much longer reach. Its direction is E.N.E. for little over a mile, its narrowest part is not over 250 yards in breadth, and the shoalest water is 6 fathoms; half a mile E.N.E. from this narrow, the course changes to S.E. by E., leaving a narrow ridge of low wooded islands on the starboard hand, off which a chain of covering rocks marked by kelp extend for nearly two cables; two-thirds of a mile on this course leads into the Strait of Georgia, when the Gabriola Reefs must be avoided. These latter are an extensive group of rocks, uncovering at low water, at $1\frac{1}{2}$ mile eastward of the Flat-top Islands. Much broken ground exists in their neighbourhood, and it is desirable to give them a good berth.

The north-eastern side of Vancouver Island will be described hereafter.

VANCOUVER ISLAND.

This extensive island has a similar relation to the Pacific Ocean to what the south-western part of England has to the Atlantic, and in many respects their climates resemble each other. But the physical characteristics of the two are widely different. The rugged coasts of Vancouver Island rise steeply from the water, backed by rounded hills, covered with the monotonous pine groves, beyond which, and traversing the island, a loftier range of bare rugged mountains culminate in a series of irregular peaks.

It is about 252 miles long, varying from 50 to 65 miles in breadth, and has an area of about one-fourth of that of England and Wales. On its S.W. face it is very deeply indented by those singular inlets so characteristic of the adjacent mainland. There is very much land quite unfit for cultivation

or colonization, but in some of the valleys and along a portion of the river banks are tracts of surpassing fertility. From its geographical position, exposed to the full scope of the westerly winds which prevail over the Pacific, the mountains, intercepting the rain clouds, furnish an abundant and never-failing supply of water, which may be certainly found at every valley or beach. The forests afford some of the finest timber in the world, whether as the largest and straightest spars for ships or for building purposes, and a large and increasing trade is rising around the saw-mills, which are established in various parts. At the same time the rocky and barren shores are covered in many places with a stunted growth of useless wood. Of other supplies, the natives in the districts away from the European settlements, will bring deer, grouse, salmon, halibut, rock-cod, and other fish, in moderate quantities and for reasonable prices, in exchange for blankets, common sheets, knives, tobacco, &c. Copper and iron have been found but not worked, especially in Barclay Sound. Traces of gold have also been met with.

Coal is one of the most important of the possessions of Vancouver Island, and appears to exist in vast quantities. It was first discovered at Nanaimo, from Indian report, by Mr. Joseph McKay, in May, 1850. In September following the same seam, called Douglas seam, was discovered on Newcastle Island, in Nanaimo Harbour. Its general thickness is from 6 to 7 feet, with from 8 to 10 inches of fine clay running through the centre. Other and larger seams than this were soon afterwards discovered, and still further examination has demonstrated that there is an unbounded supply, which is now very extensively worked.

Captain W. Colquhoun Grant, F.R.G.S., its first colonist, in 1843 made an elaborate examination of the capabilities of the island in its original uncolonized state, and in few words his views are thus: The whole centre of the island—as far as it has been at present explored—may be said to be a mass of rock and mountain, and of the little available land which is found in patches along the sea-coast, by far the greater part is densely covered with timber, the removal of which would be so laborious as to make the bringing of the said land under cultivation scarcely a profitable undertaking. The little open land which there is, however, is in general rich, and had the British Government thrown the island open to the exertions of individual enterprise, the greater portion of such open land would doubtless, ere this, have been settled. It is not, however, always that the wooded land is capable of cultivation along the sea-coast; on the contrary, the reverse is the rule; the greater portion of the land on the southern, and nearly all on the western coast, as far as it has yet been examined, consisting of barren rock, barely affording sufficient holding ground to the stunted timber with which it is covered.

His opinion of the climate, too, is not very cheerful. He says: The

climate, as usual on the coast of the Pacific, is divided into two seasons of dry and rainy, or, as Père Accolti, the Jesuit priest of Oregon, expressed it, "Huit mois d'hiver, et quatre d'enfer;" he added two months, however, to the winter for the benefit of Oregon. On Vancouver Island it generally rains and snows from October to March, and during the rest of the year a parching heat prevails, which dries up all the small streams. In the commencement of autumn dense fogs prevail, enveloping everything in obscurity, and preventing, as I think, the rays of the sun from having a due vivifying effect on the crops.

The prevailing winds along the coast in winter are from the S.E., varying from that to the S.W., and with occasional heavy northerly gales; the prevailing winds in the summer are from the North and N.W. Generally speaking, the climate is both agreeable and healthy; and not a single death that I am aware of has occurred among adults from disease during the six years that I have been acquainted with the island.*

Dr. Rattray gives the following characteristics of the different seasons in the South part of the island. The spring is short, and lasts from the beginning of March to the end of April or beginning of May. In early March the weather undergoes a marked change, and a drier and milder climate forms a decided contrast to the cold and wet winter months which precede it. Towards the end of April fine weather has fairly set in, with mild dry S.W. winds.

The summer begins with May and ends with September. Rain falls seldom and never heavily; fogs and mists are rare; sometimes the heat is excessive. The autumn, which lasts during October and November, presents a marked change. Cold and moist northerly winds succeed the dry southerly breezes of summer. Fogs begin in October, and occasionally during the latter part of September; but periods of fine mild weather, sometimes lasting ten days or a fortnight, form what is called the "Indian summer."

During the winter, which lasts from the beginning of December to the end of February, cold moist northerly and southerly winds prevail, with frequent rain and fogs. Snow is uncommon and never heavy; ice is seldom more than an inch thick.

The following remarks are from the Vancouver Island Pilot:—

Currents.—A southerly current has been found to prevail on the western coast of Vancouver Island more or less throughout the year, particularly from August to November, probably in some measure caused by the N.W. winds which blow constantly during the summer. This current joining the ebb tide out of Fuca Strait has been known to set vessels between 4 and

* See Journal Royal Geographical Society, vol. xxvii. pp. 268—320.

5 miles an hour to the southward, and during fogs there is great risk of being drifted on to Cape Flattery, or some of its off-lying dangers; extreme caution should therefore be observed in entering the strait at such times, especially near the full and change of the moon, when the tides are at their strongest.

Winds.—During summer, the prevailing winds from N.W. or S.W., take a westerly direction within the Strait of Juan de Fuca; while the S.E. gales of winter blow fairly out.

Although a westerly wind may be blowing within the strait, it frequently, during the change of the seasons, blows heavily outside at the same time from S.S.W., or sometimes suddenly changes to that direction, from a slight easterly wind on opening the entrance, which makes that part of the coast of Vancouver Island between Port San Juan and Bonilla Point a dangerous lee shore to a ship without steam power.

The coast winds in summer prevail from S.W. and N.W., the former during the early months, and the latter blow fresh and with great regularity during June, July, and August. In September and the early part of October the winds are very uncertain, and there is generally a great deal of calm, gloomy weather.

The barometer usually stands above 30.00 inches during summer; should it fall to 29.90 a south-easterly wind, with thick rainy weather, may be expected, but of short duration, and clearing up with a westerly wind as soon as the barometer rises.

The winter winds are S.E. or S.W., more frequently the former. They set in towards the end of October, and continue until the middle of April. S.E. gales are generally preceded by a short interval of calm, cloudy weather; they spring up gradually from East or E.S.E. veering to the southward, accompanied by rain and thick weather, the barometer falling rapidly; when the barometer becomes stationary the wind shifts suddenly to S.W., and blows heavily with clear weather, but frequent squalls of rain. The barometer begins to rise immediately the wind veers to S.W., from which quarter it generally blows from 12 to 20 hours.

The violence and duration of these S.E. gales is always proportioned to the fall of the mercury; with the barometer at 29.50 a strong gale may be looked for from this quarter. It seldom falls below 29.20, when very bad weather is certain to follow. On two or three occasions in as many years it has been known to fall to 28.90, and has been followed by S.E. gales of great violence.

A S.E. gale sometimes springs up, though very seldom, with the barometer above 30.00 inches. On such occasions the wind has always been preceded by calm, cloudy weather and rain, with a high but falling barometer; such gales are not violent and of short duration.

S.E. gales are always accompanied by thick dirty weather, and rain; they

seldom continue from that quarter for more than 12 or 18 hours, unless the barometer falls very low, and almost always shift to S.W.

When the S.W. gale of winter is not preceded by the south-eastern, the barometer seldom falls; it either remains stationary, when the gale may be expected to continue longer, or rises slowly, when it will gradually subside and fine weather follow. S.W. gales are accompanied by heavy banks of clouds, and passing showers of rain, sometimes snow.

The barometer has been known to fall during winter as low as 29.45 and has been followed by no gale or bad weather, but on such occasions there has been a heavy fall of snow on the hills, and a sudden fall of 15 degrees in the temperature.

A fine northerly or N.E. wind frequently occurs at intervals during the months of December, January, and February; it is always accompanied by a high barometer, above 30.0, and at such times a continuance for several days together of clear, cold, frosty weather may be looked for. The barometer on these occasions will sometimes rise as high as 30.70, and the fine weather will then probably last a fortnight or more.

Fogs.—Although fogs in this region are not nearly of such frequent occurrence as on the neighbouring coast of California, where they prevail almost uninterruptedly during summer and as late as the middle of October, yet from August to November they occasionally occur in Juan de Fuca Strait, and are sometimes very dense over the entrance for several days together. They are generally accompanied by calms or very light winds from N.W., which renders them more dangerous to sailing vessels closing the land.

The natives have been frequently described since the visit of Capt. Cook to Nootka Sound first made us intimate with them; but they are disappearing fast. The West coast of the island is very thinly populated, the highest estimate of the natives not exceeding 4,000, divided into a number of very small tribes. As a rule they are harmless and inoffensive, though in a very few cases the crews of vessels wrecked on their coasts have been plundered and ill-treated. They are addicted to pilfering, especially in the vicinity of Nootka Sound, and ought to be carefully watched; this is perhaps the worst charge that can be brought against them.

All the tribes speak a different dialect, and the Chinook jargon, which is used at Victoria in transactions with the settlers and natives, will not be generally understood on the West coast.

The island now forms an integral part of the colony of British Columbia, as explained on page 272, the seat of government for the island and continent being at Victoria.

Its S.W. coast was but very little known till the publication of the fine series of charts, the result of the elaborate survey by Capt. G. H. Richards, R.N., in H.M.S. *Plumper*. To these charts and the directions which eluci-

date them we owe the following description, which is somewhat abridged, as, for the present at least, many of the places it describes are but of little interest to the general navigator.

The present chapter will include a description of the south-eastern and south-western coasts of the island, leaving that portion on the Gulf of Georgia, &c., to be given in the next chapter.

JUAN DE FUCA STRAIT has been before described, pages 251—256, and the harbours and coast on the South side, the northern limit of the Washington Territory, is there given. We now commence with the northern side of the strait, continuing the description from the N.W. point of the entrance to its junction with the Haro Strait.

PORT SAN JUAN is the first anchorage on the North shore within the entrance of Fuca Strait. The opening, which is remarkable from seaward, is seen for a considerable distance, and makes as a deep gap between two mountain ranges. The centre of the entrance bears N.N.E. $\frac{1}{2}$ E. from Cape Flattery Lighthouse, and as the light is visible from the anchorage it is not difficult to enter or leave during night time. Off the western point, at something more than a cable's length, is a low flat rock, named *Owen Island*, awash at high water.

Observatory Rocks, at the eastern point, are high pinnacles, with two or three trees growing on them, and some smaller rocks off, the outermost of which lies $1\frac{1}{2}$ cable from the shore. At 4 cables within these rocks and $1\frac{1}{2}$ cable from the shore is another reef partly out of water, named *Hammond Rocks*. On the North side of the port some rocks and broken ground extend for a mile within Owen Point, and nearly 2 cables from the shore. One rock, awash, lies N.E. $\frac{1}{2}$ E. from Owen Island, distant 4 cables, and is $2\frac{3}{4}$ cables from the shore. The entrance points lie E. $\frac{1}{2}$ N. and W. $\frac{1}{2}$ S. of each other, distant nearly $1\frac{1}{2}$ mile. The port runs nearly straight for $3\frac{1}{2}$ miles in a N.E. by N. direction, and carries its breadth almost to the head, which terminates in a round beach composed of muddy sand. *Gordon River* empties itself through the North end of this beach, and *Cooper Inlet* penetrates its southern.

The port is entirely open to S.W. winds, during which a heavy sea rolls in if blowing a moderate gale. There is a convenient depth of water all over Port San Juan, from 6 to 9 fathoms, the bottom fine muddy sand. In the outer part of the port there is generally a swell. Good anchorage will be found about $1\frac{1}{2}$ mile from the head, with Owen Island bearing S.W., and Adze Head E.S.E., in 7 fathoms.

The hill named Pandora Peak does not show as a peak within the port.

The Coast.—From Port San Juan the shore of Vancouver Island trends East to Sherringham Point, distant 24 miles, and presents no very remarkable features. *Providence Cove*, fit for boats, lies 3 miles eastward of

San Juan; at the distance of 7 miles further East, in a small bight, is a stream named *Sombrio River*. The *River Jordan*, a considerable stream, is $5\frac{1}{2}$ miles westward of Sherringham Point. Eastward of Sherringham Point the shore curves a little to the northward, and at the distance of $4\frac{1}{2}$ miles is *Otter Point*. The points on this side the strait are not remarkable nor easily distinguished unless close inshore; some of their extremes are partially bare of trees. Vessels running or working up the strait at night should be careful not to get so near the North shore as to shut in Race Island light by Beechey Head. From Otter Point the entrance to Sooke Inlet is E. by N. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles, the intervening coast forming rather a deep indentation named Sooke Bay, in which vessels may anchor in fine weather something more than half a mile from the shore in 8 fathoms.

SOOKE INLET is a remarkable sheet of water; its entrance is little over half a mile in breadth, and leads by a narrow and tortuous channel 3 miles in length, and in a general North direction to a beautiful land-locked basin, nearly 2 miles in extent, in an East and West direction, and 1 mile North and South, with a depth of from 8 to 16 fathoms all over it. It is not likely, however, to become a harbour of much importance.

Vessels may anchor in 10 fathoms half a mile off the entrance, and, if necessary for shelter, may with a fair wind run inside Whiffin Island, where there is sufficient space to anchor.

Whiffin Island is low, gravelly, and always connected with the western entrance. Its eastern point bears N.N.E. three-quarters of a mile from the centre, between the two entrance points; it must be rounded close, leaving it on the port hand, as a reef lies only half a cable eastward of it. On rounding the point drop the anchor at a cable's length within in 8 fathoms; here there is a space of deep water 2 cables in extent.

Secretary Island, small and wooded, lies $1\frac{1}{2}$ cable off Possession Point, a mile south-eastward of Sooke Inlet. There is a depth of 16 fathoms between it and the main shore, and from it Beechey Head bears E. $\frac{1}{4}$ S. $2\frac{1}{2}$ miles, with a bold steep shore between, and deep water close-to.

BECHER BAY.—*Beechey Head* is a bold wooded cliff, forming the West entrance point of Becher Bay, *Cape Church* being the eastern one. The breadth of the entrance is something over a mile, and off the eastern side are several small wooded islands, named Bedford Islands. The depth of water at the entrance varies from 20 to 50 fathoms, rocky and irregular bottom. At three-quarters of a mile within in a northerly direction are Wolf and Frazer Islands, with some small islets off them; between these two islands, which lie East and West of each other, Frazer being on the eastern side, is the channel 4 cables wide to the anchorage; it then takes a north-easterly direction for three-quarters of a mile, where anchorage in 10 fathoms may be had, with the centre of Frazer Island bearing S.S.W., distant a quarter of a mile.

Becher Bay cannot be recommended as a good anchorage; it affords no great shelter with southerly or westerly winds, and vessels outward bound had far better wait a fair wind in Parry Bay to the northward of Race Islands. Vessels bound up the strait should pass the land about Beechey Head at the distance of 2 miles, if intending to go outside the Race Islands. Steamers intending to take the Race passage may pass Cape Church about half a mile distant, and keep the land aboard about that distance until up with Bentinck Island, when the latter should be closed and kept within a quarter of a mile or just outside the kelp. The passage between Bentinck Island and the Vancouver shore is choked with rocks, and strong tides run both inside and outside.

RACE ISLANDS are a cluster of low bare rocks, the outermost of which lies a mile S.E. of Bentinck Island at the S.E. point of Vancouver Island. They occupy more than half a mile in extent, North and South, and the same East and West. The outermost and largest, or Great Race, is $1\frac{1}{2}$ cable in extent and 25 feet high; the others are smaller, a few feet above high water or awash. The tides among them run from 3 to 6 knots, and during bad weather heavy and dangerous races occur. The outer rock should be given a berth of a mile, at which distance from 40 to 50 fathoms of water will be found; it may, if necessary, however, be rounded at a less distance, the most off-lying danger being the Rosedale Rock, with 5 feet on it, lying S.E. by E. from the Great Race distant 4 cables. In light winds a sailing vessel should give these islands a good berth, especially when eastward of them, as the ebb sets strongly towards them.

Race Island Lighthouse, on Great Race Rock, consists of a keeper's dwelling of stone with a tower of the same material, the latter being painted with alternate horizontal black and white bands. It exhibits, at an elevation of 118 feet above the mean level of the sea, a white light of the second order, which shows a *flash* every *ten seconds*, visible in clear weather at a distance of 18 miles. Lat. $48^{\circ} 17' 45''$ N., long. $123^{\circ} 32' 15''$ W.

Race Passage is a clear channel, 4 cables in breadth, between the Race Rocks and Bentinck Island, with a depth of not less than 14 fathoms. This passage may be taken by a steamer; but it is not recommended for a sailing vessel under ordinary circumstances, on account of the strength of the tides, and races caused by the irregular rocky nature of the bottom. The course through is N.N.E. and S.S.W.

After rounding Race Island Lighthouse at the distance of a mile, the course for Esquimalt Harbour is N. $\frac{1}{2}$ W. $8\frac{1}{2}$ miles. The lighthouse on Fisgard Island is very conspicuous, and will be seen immediately on rounding the Race Islands; a course direct for it will clear all dangers, but attention must be paid to the set of the tides. The ebb runs almost directly from the Haro and neighbouring straits towards the Race Islands, and a sailing vessel, unless with a commanding wind, should give them a berth of more

than a mile. The flood sets in the opposite direction to the N.E., and with light winds vessels are liable to be carried to the eastward.

By night, when Fisgard Island light bears N. by W., a vessel may steer boldly for it. The only precaution necessary is to keep the white light in full view.

Entering Esquimalt Harbour, the Fisgard Island light should be left from 1 to 2 cables on the port hand; when it bears N.W. by W. $\frac{1}{2}$ W. the light changes from white to red, and shows the latter colour within the harbour; and when it bears S. by W. at a convenient distance, a vessel may anchor in 7 fathoms, or stand into Constance Cove if preferred. The Scroggs Rocks, on the eastern side of the entrance of the harbour must be avoided; they bear E.S.E. from Fisgard Island distant nearly 4 cables.

The entrance of Victoria Harbour being only 2 miles eastward of Esquimalt, the same precautions are necessary as regards the tides. The course from a mile off the Race Islands is N. $\frac{1}{2}$ E.; during daytime Christ Church, a conspicuous white building with a spire, and standing on an eminence, will be seen shortly after rounding these islands, bearing N. by E. It should be kept just on the starboard bow. At night, or during bad weather, it is strongly recommended not to run for this harbour; but if it is decided to run for Victoria, it must be borne in mind that when Fisgard Island light changes from white to red, a vessel will be very near the shore.

Bentinck Island, lying close off the S.E. point of Vancouver Island, is little over half a mile in extent, irregularly shaped, and 100 feet high, being almost divided in the centre by a narrow neck.

Between Bentinck Island and Esquimalt Harbour, a distance of 8 miles, the coast is indented by several bays, and anchorage may be obtained in 8 to 10 fathoms anywhere within a mile of the shore, except immediately off Albert Head. The only danger is a reef lying about a cable's length off the head.

Pedder Bay, the first of these indentations, has its entrance immediately northward of Bentinck Island, 2 miles N.N.W. of the Great Race, between Cape Calver and William Head, where its breadth is three-quarters of a mile. The inlet runs to the W.N.W. for 2 miles, narrowing rapidly, and when half a mile within is only fit for small craft, which may find good shelter at its head. Vessels of any size may anchor in the entrance in 7 fathoms.

Parry Bay, immediately northward of William Head, affords good anchorage with all westerly winds. Vessels bound to sea and meeting with a strong wind from this quarter are recommended to return here; the anchorage is in 9 fathoms, from half to three-quarters of a mile off the sandy beach, with William Head bearing S.W. by S. about the same distance.

Albert Head, the North point of the bay, is moderately high, sloping to the sea, bare of trees at its extreme, but wooded immediately behind; a

reef lies a cable off it. *William Head* somewhat resembles it, but is lower. The water is too deep for anchorage immediately off these heads.

ROYAL BAY or ROADS, of which *Albert Head* is the souther point, and the entrance of *Esquimalt Harbour*, the northern limit, is a fine sheet of water 3 miles in extent, and affords good anchorage with all winds which would prevent a vessel from entering that harbour. A vessel may anchor anywhere within three-quarters of a mile from the western shore. A good berth is a mile South of *Duntze Head* with the entrance open, or *Thetis cottage* just open of *Inskip Rocks* (in the harbour), which is the leading mark for clearing the *Scroggs Rocks* running in or out.

LIGHT.—A lighthouse is erected on *Fisgard Island*, a small rocky islet 25 feet high, and almost connected with the shore, forming the western entrance point of *Esquimalt Harbour*; the tower is of brick whitewashed, and is elevated 70 feet above the mean level of the sea, with a red brick dwelling-house adjoining. The light is *fixed*, and of the fourth order; it shows *white* when bearing from N. $\frac{1}{4}$ W. to N.W. by W. $\frac{1}{4}$ W.; *red* from N.W. by W. $\frac{1}{4}$ W. to S. $\frac{1}{4}$ E., and *green* from N. $\frac{1}{4}$ W. to N. by E. $\frac{1}{4}$ E. The white light is intended to guide a vessel in from seaward, and while visible clears alike the western coast between *Race Island* and *Esquimalt*, and the southern shore with its off-lying dangers, *Scroggs Rocks* and *Brochy Ledge*, between *Duntze Head* and *Trial Island*. The red light will be found useful by vessels bound to *Victoria* or *Esquimalt* from the eastward, after rounding *Trial Island* it will indicate a vessel's distance from the shore, and if bound to *Esquimalt*, a W.S.W. course will lead a safe distance outside *Brochy Ledge*, until the light changes from red to white, when it may be steered for, and not before. A *green ray* of light is thrown up the harbour between the *Whale Rock* and the western shore, and leads westward or inside the line of that rock.

ESQUIMALT HARBOUR is a safe and excellent anchorage for ships of any size, and with the aid of the light on *Fisgard Island* may be entered at all times with great facility. The entrance, which bears North $8\frac{1}{2}$ miles from the lighthouse on *Great Race Island*, is between *Fisgard Island* and *Duntze Head*, and is 3 cables in breadth, opening out immediately within.

The only dangers are the *Scroggs Rocks*, which lie on the eastern side, S.S.E. 3 cables from *Duntze Head*, and cover at three-quarters flood. *Inskip Islands* kept well open of the head leads clear to the westward of them, but the best mark for entering with a leading wind is *Thetis Cottage*, a conspicuous white building on *Dyke Point*, just open or on with the western *Inskip Rock*, bearing N. by W. $\frac{1}{4}$ W., which leads in mid-channel.

Fisgard Island should not be passed within less than a cable's length, keeping just without the kelp, which extends about half a cable eastward of

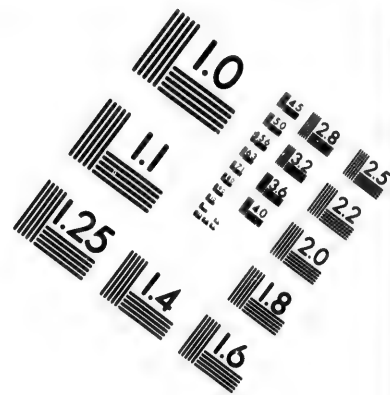
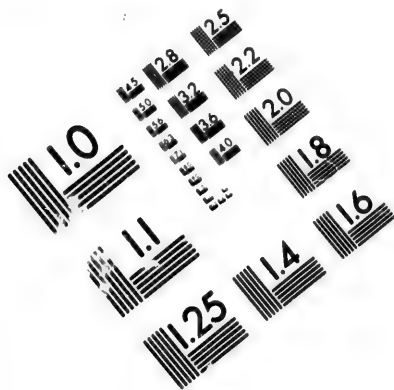
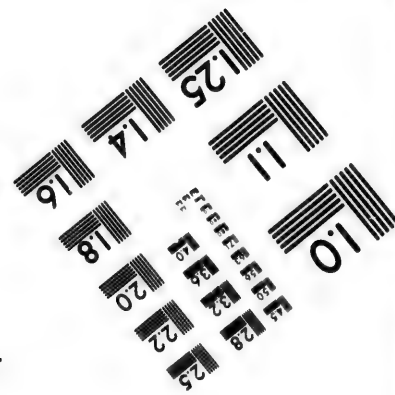
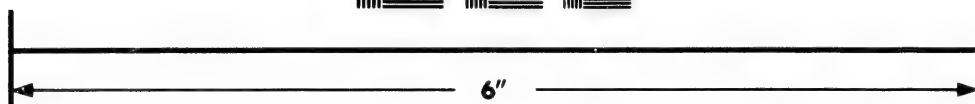
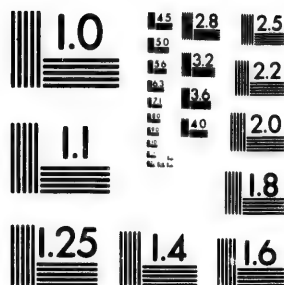


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it, for a rock with 7 feet water over it lies three-quarters of a cable N.E. of the lighthouse.

Vessels entering the harbour at night with a strong wind after them should take care to shorten sail in time, as the space for rounding to is somewhat limited; and it is desirable to moor if any stay is intended, as the winds are changeable.

The best time to leave the harbour is early in the morning, when either a calm or light land wind may be expected. There is little strength of tide in the harbour, or for some distance without, and it sets fairly in and out.

The strongest and most frequent gales blow from S.W. and S.E., which are leading winds in, but rarely from N.W. The S.W. is a summer wind, generally fresh, and brings fine weather, unless it blows a gale. South-east winds may be looked for during the winter months, or between November and March, and generally a strong gale once in a month with rain and thick weather. The N.E. wind rarely blows with much strength, and always brings fine clear weather; a direct South wind, to which some parts of the harbour are open, seldom blows, and there is never sufficient swell to render the anchorage inconvenient.

The **Whale Rock**, with only 7 feet on it at low water, lies W. $\frac{1}{4}$ N. 2 cables from Inskip Islands, or nearly midway between them and the western shore of the harbour. This rock is of small extent, and not marked by kelp; it has a clear passage on either side, that to the eastward being the widest. Yew and Rodd Points, just touching, point to the rock; Yew Point, just touching the lighthouse on Fisgard Island, S. by E. $\frac{3}{4}$ E., leads nearly a cable's length westward; and when Ashe Head is well shut in by Inskip Islands, a vessel will be clear to the northward.

Anchorage.—The most convenient anchorage is in Constance Cove, on the eastern side of the harbour, immediately round Duntze Head, the general depth being 6 fathoms, and the holding ground good; there is, however, safe anchorage in any part of the harbour, in not less than $4\frac{1}{2}$ fathoms, as far northward as Dyke Point. A cable's length above this point the water shoals to 3 fathoms, and from thence to the head of the harbour is a flat with only a few feet on it at low water.

Thetis Cove in Plumper Bay, on the eastern side, immediately North of Constance Cove, is a snug anchorage, with the harbour entrance just shut in by Inskip Rocks in $4\frac{1}{2}$ fathoms; but vessels proceeding above these rocks must take care to avoid the Whale rock.

Water may be obtained during the winter months without difficulty from the many streams that empty themselves into the different bays, caused by the great quantity of rain which usually falls at that season; but in summer watering is a tedious process, and boats must be sent either to Rowe stream, at the head of the harbour, or to the salt lagoon just outside the entrance. Both offer difficulties, unless at or near high water.

North Pacific.

Water, however, might be conveyed at all seasons, and at a trifling expense, from the chain of lakes just over the western side of the harbour, near Colwood Farm.

VICTORIA HARBOUR is a little more than 2 miles eastward of Esquimalt, with its entrance between Ogden and MacLaughlin Points. Macaulay or Sailor Point, a remarkable projection nearly midway between the two harbours, is a bare flat point about 30 feet high, showing as a yellow clay cliff, worn by the action of the sea and weather into a rounded nob at the extreme. The coast on either side of this point for a mile is fringed with sunken rocks, and is dangerous for boats in bad weather, many fatal accidents having occurred.

The entrance to this harbour is shoal, narrow, and intricate, and with S.W. or S.E. gales a heavy rolling swell sets on the coast, which renders the anchorage outside unsafe, while vessels of burthen cannot run in for shelter unless at or near high water. Vessels drawing 14 or 15 feet water may, under ordinary circumstances, enter at such times of tide, and ships drawing 17 feet have entered, though only at the top of spring tides.

The channel is buoyed, but it is necessary to take a pilot, and the space is so confined and tortuous that a long ship has considerable difficulty in making the necessary turn. A large per-centage of vessels entering the port, small as well as large, constantly run aground from these causes, or from trying to enter at an improper time of tide, or neglecting to take a pilot. Such accidents, however, are seldom attended with more than delay and inconvenience, as the shoalest and most intricate part of the passage is sheltered. When within, the port is perfectly land-locked, and vessels may lie in from 14 to 18 feet at low water, but the harbour accommodation is limited.

Anchorage.—Vessels anchoring outside the harbour to wait for the tide, or from other causes, should not come within a line between Ogden and MacLaughlin Points, the former bearing W. $\frac{1}{4}$ N., the latter E. $\frac{1}{4}$ S., midway between, or a quarter of a mile from either. This is a good stopping place with off-shore winds or fine weather, but is by no means recommended as a safe anchorage for sailing vessels during the winter months, when bad weather may be looked for with little warning.

There are three or four pilots attached to the port, who keep a good lookout for vessels off the entrance. Pilotage is compulsory to all merchant vessels, except coasters, but the charges are moderate.

Brotchy Ledge.—About 4 cables from Holland Point, and right in the fairway of vessels entering Victoria Harbour from the eastward, lies the Brotchy Ledge, with 5 feet on its shoalest part; it is covered with kelp, and about a cable in extent within the 5-fathom line. There are 9 fathoms between the ledge and the shore.

A spar buoy, painted *white*, marks this ledge. It lies in 12 feet water,

with the beacons on Beacon Hill in line, bearing N.E. by E. ; Ogden Point N. $\frac{1}{2}$ W. distant 5 cables; and Holland Point N.E. 4 cables. The buoy is occasionally washed away during the heavy winter gales.

Fisgard Island Lighthouse, North part of Brothers Island, and Macaulay Point in line W. $\frac{1}{2}$ N., leads a cable North of the ledge in 9 fathoms, between it and the shore; and the lighthouse, just open southward of Brothers Island W. by N. $\frac{1}{2}$ N., leads 2 cables South of the ledge in 21 fathoms.

In entering or leaving Victoria Harbour, keep either of the above marks on, till past the line of the beacons on Beacon Hill in line, when a vessel will be clear of the ledge. Coasters, and those acquainted with the place, usually go North of it.

The COAST from Victoria Harbour trends in an easterly direction for 2 miles to Clover Point, and is for the most part faced by white sandy cliffs, varying in height from 10 to 80 feet; a sandy beach extends along the whole way, and at a cable's distance off in many places are rocks and foul ground. Two cables East of Holland Point, and a cable off shore, are the *Glimpse Reefs*, which cover at three-quarters flood, and have 7 fathoms just outside them.

Beacon Hill, a gentle rise of the land, 2 cables from the water's edge, and a mile East of the harbour, is grassy and bare of trees; its height is 140 ft. and there is a staff or beacon on the summit. *Clover Point*, at 2 miles eastward of the entrance to Victoria Harbour, is low, bare of trees, and projecting. It is steep-to, and off it are some strong tide-rips, dangerous to boats in heavy weather. *Ross Bay*, to the eastward of it, is open, but sometimes used by small craft if waiting for the tide, there being from 4 to 5 fathoms at 2 cables distance off shore. *Foul Bay*, nearly a mile N.E. of Clover Point, is of small extent, and filled with rocks. Off its entrance are the Templar Rocks, about 4 feet under water, and marked by kelp.

Trial Islands, nearly $1\frac{1}{2}$ miles eastward from Clover Point on the South side of Enterprize Channel, are two in number, bare and rocky, but generally appear as one. Strong tide ripples prevail off the southern island, especially during the flood, which runs nearly 6 knots at springs just outside it.

Enterprize Channel, between Trial Islands and the Vancouver shore is a narrow, tortuous, but deep channel, much used by steamers and coasters trading to Victoria Harbour, as a slight saving of distance is effected, and less tide experienced than by going South of the Trial Islands. Its length is about a mile. *McNeil Bay*, on the North side of the channel eastward of Foul Point, is upwards of 3 cables in extent, with from 2 to 6 fathoms water. It is open to the southward. *Mouatt Reef*, in the eastern part of the channel, 3 cables from Trial Island, and nearly 2 cables off shore, is about a

cable in extent, and covers at a quarter flood. This rock is dangerous for vessels using the Enterprize Channel, as it lies just North of the fairway.

GONZALES POINT forms the S.E. extremity of Vancouver Island. It is a low salient point, rocky, bare of trees, and steep-to on the East side.

Oak Bay.—From Gonzales Point the Vancouver shore trends to the northward, and at a mile from the point forms a sandy bay, which is somewhat less than a mile in extent, and affords fair anchorage near its North part in from 3 to 4 fathoms.

CADBORO BAY, $2\frac{1}{2}$ miles to the northward of Gonzales Point, is about half a mile in extent, and open to the S.E.; no sea, however, rises within it, and there is good anchorage in from 3 to 4 fathoms near the entrance.

Mayor Channel, to the northward of Gonzales Point, and West of Chain Islets, is about 2 miles long in a winding direction to the northward; its breadth in the narrowest part is 3 cables, and the soundings in it vary from 9 to 13 fathoms. The channel is bounded on the West side by Thames Shoal and Fiddle Reef, and abreast the latter on its opposite side lies the Lewis Reef. The tide seldom runs more than 3 knots through this channel, and it is the one generally used. *Thames Shoal*, of 2 fathoms water, is of small extent, and marked by kelp; it lies nearly half a mile N. by E. from Gonzales Point, at the S.W. part of the Mayor Channel.

Lee Rock, which only uncovers at low-water springs, lies $1\frac{1}{2}$ cable westward of Thames Shoal. It is marked by kelp, and steep-to on the East side. Between this rock and Thames Shoal is Mouatt Channel, a cable wide, with from 7 to 9 fathoms.

Fiddle Reef, at the N.W. extreme of Mayor Channel, and upwards of a mile from Gonzales Point, is of small extent, and awash at high water spring tides. It may be approached close-to on the East side.

Todd Rock, at 2 cables West of Fiddle Reef, in the entrance to Oak Bay, covers at two-thirds flood, and is marked by kelp.

Lewis Reef, at the N.E. part of Mayor Channel, nearly 3 cables S.E. of Fiddle Reef, and 2 cables West of the Chain islets, covers at high water, and may be approached close-to on the West side. The passage between it and Chain Islets is filled with kelp, but has not less than 2 fathoms.

CHAIN ISLETS, midway between Discovery Island and the Vancouver shore, are a bare rocky group, three-quarters of a mile long in a westerly direction, and half a mile wide. *Spencer Ledge*, off their East side, at a distance of 2 cables from the easternmost high-water rock, is marked by kelp, and has 9 feet on its shoalest part; if going through Hecate Passage it requires to be guarded against. Cadboro Point, open West of Channel Point N.N.W. $\frac{1}{2}$ W. leads a cable East of this ledge through Hecate Passage.

Caroline Reef, at the North part of the group, and connected to it by a rocky ledge, is of small extent, and covers at a quarter flood, but is well out of the track of vessels using any of the channels. Foul ground, with

from 3 to 4 fathoms, and marked by kelp, exists upwards of a cable West of it.

DISCOVERY and CHATHAM ISLANDS.—Discovery Island is 2 miles N.E. of Gonzales Point, at the junction of the Haro and Fuca Straits. It is wooded, about three-quarters of a mile in extent, and its shores on all sides are bordered by rocks. *Rudlin Bay*, on its S.E. side, is filled with rocks, and should not be used by any vessel.

Chatham Islands, to the N.W. of Discovery Island, and separated from it by a narrow boat pass, are of small extent, forming an irregular group, low and wooded, the tide rushing with great strength through the passages between them. *Leading Point*, at the South extreme, is a bare rocky islet at high water. *Channel Point*, their West extreme, is also bare and steep-to; the tide runs strong past it. *Strong Tide Islet*, the N.W. of these islands, is rocky, about 50 feet high, and wooded. Its West side forms the eastern boundary of Baynes Channel, and is steep-to. The ebb tide runs very strongly past it, nearly 6 knots at springs. *Refuge Cove*, on the East side of the Chatham Islands, is small, and has $1\frac{1}{2}$ fathom in the centre; coasters or small craft entangled among these islets may find shelter in it. *Alpha Islet*, the easternmost of the group, is bare, and 16 feet above high water.

Fulford Reef, 3 cables North of the Chatham Islands, is about a cable in extent, and covers at three-quarters flood. Vessels using the Baynes Channel should keep well to the westward to avoid this reef, as the tide sets irregularly in its vicinity.

Hecate and Plumper Passages.—Discovery Island is separated from the Chain Islets by a passage half a mile wide in the narrowest part, forming an apparently clear and wide channel, but near the middle of the South part lies *Centre Rock*, which has only 3 feet over it, and though marked by kelp, this, from the strength of the tides, is often run under, and seldom seen. There is a deep passage on either side of this danger, the one to the westward being called Hecate, and the eastern one Plumper Passage. The latter is wider, and best adapted for large steamers, but the tide sets very strongly through both of them.

Baynes Channel, between Cadboro Point and the Chatham Islands, connecting these inner channels with Haro Strait, is upwards of a mile long and half a mile wide. The soundings in it are irregular, varying from $4\frac{1}{2}$ to 30 fathoms, and the tide at springs rushes through it with great velocity, strongest along the eastern side.

The *Five-fathom Shoal*, lying in the centre of the channel, is not marked by kelp. If wishing to avoid it, a vessel has only to keep a little over on either side of mid-channel.

CADBORO POINT, on the Vancouver shore, at the termination of the inner channels, is nearly 3 miles North of Gonzales Point, and three-quarters of a mile West of the Chatham Islands. It is about 50 feet high, rocky and

bare of trees. A small islet lies just off it, also a reef which covers. In passing do not approach the islet within 2 cables.

The coast West of Cadboro Point to Cadboro Bay is low, very much broken, and there are some off-lying rocks. *Jemmy Jones Islet*, which is bare and 15 feet above high water, lies 3 cables off shore, midway between the two points.

None of these inner channels, though deep, should be used except by steamers of moderate size or small craft, unless in cases of necessity. Coasters and small steamers, when taking advantage of them, generally proceed through the Mayor Channel. The Hecate and Plumper Passages are nearly straight, and better adapted for large steamers than those West of the Chain Islets.

Tides.—The high water, at full and change, is irregular, and much influenced by prevailing winds; the greatest rise and fall of tide at Discovery Island is 12 ft. During summer months the flood stream commences at 11^h 15^m a.m., running with great strength till nearly 3 p.m., after which but little tide is felt till 4 a.m. on the following day, when the ebb commences and runs strong till nearly 11 a.m., the time of low water by the shore.

CONSTANCE BANK, lying in the Fuca Strait, nearly 6 miles S.E. by E. $\frac{1}{2}$ E. from Fisgard Island lighthouse, 3 miles S. by W. from Trial Island, and 7 miles N.E. from Race Island lighthouse, is upwards of a mile in extent with 9 to 14 fathoms, but a vessel should not anchor on it.

Fonte' Bank, about a mile in extent, with from 3 $\frac{1}{2}$ to 5 fathoms, and marked by kelp, lies nearly in the middle of Fuca Strait, 6 miles S. $\frac{1}{2}$ W. from Cattle Point, San Juan Island 8 miles E. by S. from Discovery Island, and 8 miles W. $\frac{1}{2}$ S. from Smith or Blunt Island lighthouse. This bank ought to be avoided, as there may be less water on it than was found.

HARO STRAIT has been described on pages 287—304. We now proceed with the Western Coast of Vancouver Island, commencing with the coast beyond Port San Juan, described on page 316.

The **WESTERN COAST** of Vancouver Island is comprised between Bonilla Point, at the entrance of Juan de Fuca Strait and Cape Scott, the N.W. extreme of the island, a distance of upwards of 200 miles. Its general direction is W.N.W. and E.S.E., but the coast is broken into deep inlets, the principal of which, Barclay, Clayoquot, Nootka, Kyuquot, and Quatsino Sounds, are large sheets of water, with features similar to the other great inlets on this part of the American continent.

Making the Land.—When first making the land, an unbroken range of mountains will be seen; on a nearer approach it appears thickly wooded, and apparently fertile, intersected with many deep openings and valleys,

which in most cases are some of the inlets before mentioned. The coast is generally low and rocky, but rises immediately to mountains of considerable height. It is fringed by numerous rocks and hidden dangers, especially near the entrances of the sounds, and the exercise of great caution and vigilance will be necessary on the part of the navigator to avoid them, even with the present Admiralty charts. On no occasion, therefore, except where otherwise stated in the following pages, should a stranger attempt to enter any of the harbours or anchorages during night or thick weather, but rather keep a good offing until circumstances are favourable; and when about to make the coast, it cannot be too strongly impressed on the mariner to take every opportunity of ascertaining his vessel's position by astronomical observations, as fogs and thick weather come on very suddenly at all times of the year, more especially in summer and autumn months.

Tides.—All along the outer coast or West of Vancouver Island it may be said to be high water at full and change when the moon crosses the meridian, viz., at noon and midnight, the tide showing considerable regularity as compared with the inner waters, the greatest rise and fall being everywhere about 12 ft. There are two high and low waters in the 24 hours all the year round. In summer months the superior high water is at midnight, and in winter months at noon.

The flood stream appears to set along the coast to the north-west, and the ebb to the south-east; neither are of great strength, except in the vicinity of Fuca Strait and the Scott Islands. In summer months a set is generally found to the southward, and in winter in the opposite direction, but the currents are irregular, and influenced by prevailing winds.

Soundings.—At the entrance of the Fuca Strait the 100 fathom edge of the bank extends upwards of 30 miles off shore; it then runs nearly straight in a N.W. by W. direction, gradually nearing the coast, and abreast Cape Cook or Woody Point the depth of 100 fathoms will be obtained within 4 miles of the shore; to the N.W. of Woody Point the 100-fathom edge does not extend more than 10 miles off shore, and to the southward and westward of the Scott Island even less.

The nature of the bottom, when under 100 fathoms, appears to be generally composed of sand and gravel, and does not differ in one part from another sufficiently to afford any guide for ascertaining a vessel's exact position on the coast; the bank, however, extends far enough off shore to the S.E. of Cape Cook, that if running for the coast in thick weather, the mariner, by sounding in time, will get due notice of his approach to the land, as the edge of 100 fathoms does not come within 18 miles of it, and the bank shoals very gradually.

The Coast from Port San Juan runs 10 miles in a westerly direction to Bonilla Point, rising gradually to elevations from 1,000 to 2,000 ft. *Bonilla Point*, the North entrance point of Fuca Strait, is 12 miles N.N.W. of Cape

Flattery; the point slopes gradually to the sea, is not in any way remarkable, and may be approached within one mile.

Nitinat Lake, the entrance to which is narrow and shoal, is 7 miles westward of Bonilla Point. The lake is of considerable size, extending to the northward. There are only 1 to 2 fathoms in the entrance, and the sea generally breaks heavily across it in bad weather. Four miles to the westward of the entrance is a remarkable water-fall, called by the natives *Tausiat*, which may be seen at a good distance, even in thick weather, when it would help to identify a vessel's position, being the only water-fall on this part of the coast.

Pachena Bay, 20 miles westward of Bonilla Point, is nearly 2 miles deep in a northerly direction, and half a mile wide, with from 5 to 6 fathoms water, but as it is open to the southward and S.W., and there is usually a heavy swell setting into it, no vessel should anchor there.

The coast between Pachena Bay and the S.E. point of entrance of Barclay Sound, a distance of 3 miles, is rocky, forming an open bay that affords no shelter.

BARCLAY SOUND* is an extensive arm of the sea, 30 miles westward of the entrance of De Fuca Strait. It is upwards of 14 miles wide at entrance, and though encumbered by numerous islands it maintains this breadth for nearly 12 miles inland, when it separates into several narrow inlets or canals, the principal of which, the Alberni Inlet, extends 23 miles in a northerly direction, its head reaching within 14 miles of the eastern or inner coast of Vancouver Island. Off the entrance, and in the southern parts of the sound, are innumerable rocks and islands, with several navigable channels between them, which, however, ought to be used with great caution by a stranger. The shores are low, except in the northern part and among the canals, when they become high, rugged, and mountainous.

It is high water, full and change, in Barclay Sound, at 12^h, and the rise and fall of tide is about 12 ft.

A bank of sand and gravel, with depths from 25 to 45 fathoms, extends 20 or 25 miles to the southward and westward of the entrance of Barclay Sound. In the middle of this bank there is a deep hole, the E. part of which is 5 miles S.W. from the entrance; from thence the hole extends 19 miles in a W.S.W. direction, with depths varying from 60 to 100 fathoms.

There are three navigable ship channels into Barclay Sound, viz., the Eastern, Middle, and Western, and all require great caution in navigating; they will be described in their regular order.

* Barclay Sound, as it is now spelt, at the head of which the Alberni Settlement is placed, should properly, I believe, be "Berkely," as it was named by Captain Berkely, of the ship *Imperial Eagle*, who in 1787 discovered, or rather rediscovered, the Strait of Fuca.

—Capt. R. C. Mayne.

The **Eastern Channel**, on the eastern side of Barclay Sound, between the main shore and Deer Islands, is 12 miles long in a N.N.E. direction, and its breadth varies from 1 to 1½ mile. Its shores are low and rugged, except in the North part, which becomes high. The soundings in the entrance vary from 18 to 22 fathoms, increasing gradually to 90 and 100 fathoms at the North part. There are several dangers within it, the rocks off Cape Beale and Channel Rocks at the southern part, and the Fog Rock off the East side of Tzaartoos Island.

CAPE BEALE, the S.E. point of entrance of Barclay Sound, and of the Eastern Channel, is 30 miles N.W. by W. ¼ W. from Cape Flattery lighthouse. It is a bold rocky point, 120 feet high, and some rocks extend off it, from 2 to 4 cables.

Bamfield Creek, 4 miles from Cape Beale, on the East side of the channel, runs in 1½ mile in a southerly direction; there is room for a vessel to moor at a short distance from its head in 6 fathoms. *Grappler Creek* extends from the entrance of Bamfield Creek two-thirds of a mile to the eastward. *Kelp Bay*, 5½ miles from Cape Beale, is two-thirds of a mile wide, a quarter of a mile deep, and affords a fairly-sheltered anchorage in 6 to 14 fathoms.

Mark Islet, 8 miles from Cape Beale, and one cable off the East side of the channel, is small and wooded, and conspicuous from the entrance of the Middle Channel.

Numukamis Bay, 9 miles from Cape Beale, at the N.E. part of the Eastern Channel, is of an oblong shape, 3 miles wide and 1½ mile deep; its shores rise gradually to mountains from 1,000 to 2,000 ft. high. In the centre of the bay are the *San José* and *Reef Islets*, of small extent and low.

Poett Nook, in the South part of this bay, about one mile within its S.W. point, is a landlocked basin, about 3 cables long and 2 cables wide, with 7 fathoms water.

Turn Island, at the N.E. point of the Eastern Channel, and dividing it from the Alberni Channel, is small and wooded, and separated by a narrow boat pass from the E. shore.

Ship Islet, at the S.W. point of the Eastern channel, N.W. ¼ N., 2 miles from Cape Beale, is 100 ft. high and rocky, with a few remarkable trees on its northern part, which at some distance seaward give the islet the appearance of a ship under sail, and form a good mark for identifying the channel. There are from 23 to 24 fathoms at 2 cables distance from it.

DEER ISLANDS form the western boundary of the Eastern Channel, and run N.N.E. and S.S.W. for 10 miles, with a breadth varying from one to 2 miles. They are low, and of inconsiderable size, except the northern one, which is 1,000 ft. high in parts, and of considerable extent. There is only one navigable passage through them, the Satellite Pass, between Helby and Hill Islands.

King Island, the southernmost of these islands, is about one mile long and

half a mile broad. Its shores are very rugged and broken, with rocks extending from 1 to 2 cables off.

Channel Rocks, on the West side of the channel, 3 cables East of King Island, and 1 mile E.N.E. from Ship Islet, are about 1 cable in extent, and cover at half flood. There are 10 to 12 fathoms at the distance of a cable to the eastward of them, and the sea generally breaks over them. They must be carefully avoided.

Diana Island, separated from King Island by a passage full of rocks, is of triangular shape, about $1\frac{1}{4}$ mile wide, and three-quarters of a mile broad. Its shores are rocky, and at a distance of 2 cables from its E. side is *Todd Rock*, awash at high water, with 16 fathoms close to it.

Entrance Anchorage.—*Helby Island*, the next island northward of Diana, has off its North side a small, but well sheltered, anchorage, in from 6 to 9 fathoms, easy of access from either the Eastern or Middle Channels, and very convenient as a stopping-place for vessels entering or leaving Barclay Sound.

Hill Island, two-thirds of a mile North of Helby Island, and separated from it by the Satellite Pass, is small, with a summit of moderate height at its southern end. At a quarter of a mile South of it is a patch of $3\frac{1}{2}$ fathoms water, marked by kelp, and there are several small islets and rocks off its E. and W. sides.

Robbers Island, separated from Hill Island by a passage full of rocks, is 2 miles long and 1 mile broad at its widest part. It is low and steep-to on the eastern side, and between it and Tzaartoos Island is a small landlocked basin of 5 to 7 fathoms water, but almost inaccessible.

Tzaartoos or Copper Island, the northernmost of the Deer Islands, is $4\frac{1}{2}$ miles long in a N.N.E. direction, and $1\frac{1}{2}$ mile broad. It is higher than the other islands, rising in many parts to 800 and 1,000 ft.; its eastern side, except in the vicinity of Sproat Bay, is steep-to, and may be approached to 2 cables. Limestone of a fine quality is to be found in its northern part, and there are several indications of copper and iron ores.

Sproat Bay, on the East side of Tzaartoos Island, is about half a mile wide and 2 cables deep. In its centre are two small islets, and between them and the southern side of the bay a vessel may anchor in from 11 to 15 fathoms. *Leading Bluff*, situated just South of the bay, is a steep point 400 ft. high, and conspicuous from the entrance of the Eastern Channel.

Fog Rock, lying about 2 cables East of Sproat Bay, is of small extent, with only 9 ft. over it, and steep-to all round. This danger is in the track of vessels using Sproat Bay, and requires caution to avoid it, not being marked by kelp in the spring.

Nob Point, the S.W. entrance point of Alberni Inlet, and N.W. point of Eastern Channel, is about half a mile to the northward of Tzaartoos Island,

and nearly 13 miles from Cape Beale. It is a remarkable cliffy projecting point 476 ft. high, steep-to on its South and East sides.

ALBERNI INLET, at the N.E. part of Barclay Sound, runs in a winding northerly direction for 22 miles, with a breadth varying from 2 cables to 1 mile, and terminates in a fine capacious anchorage at its head; the shores on either side are rocky and rugged, rising abruptly from the sea to mountains 2,000 and 3,000 ft. high; at the head, however, the land becomes low and fertile, a large quantity being fit for cultivation. A settlement and large saw mills are established there, and quantities of timber exported to different parts of the world.

The soundings to within 1 mile of the head vary from 160 to 40 fathoms, and the shores of the inlet are everywhere free from danger. The entrance between Nob Point and Turn Island lies at the termination of the Eastern Channel, 13 miles N.N.E. from Cape Beale.

San Mateo Bay, on the East side of the inlet, $1\frac{1}{2}$ mile North of Turn Point, is three-quarters of a mile wide, and one mile deep. Its shores are high, and the soundings in it vary from 20 to 50 fathoms, being too deep for anchorage.

Mutine Point, midway between this bay and Turn Island, is rocky, and as at a short distance off it a rock is said to exist, a berth of 2 cables ought to be given in passing. Just South of this point is a small bay with irregular soundings from 11 to 17 fathoms, which might be used as a stopping-place.

UCHUCKLESIT HARBOUR, on the West side of the inlet, 2 miles within Nob Point, is 3 miles long in a westerly direction, and its average breadth is about half a mile; the North shore is high, rising gradually to mountains of 2,000 and 3,000 feet, but the South shores and head are low; all are free from danger at the distance of a cable. The soundings vary from 20 to 40 fathoms, and there are two secure anchorages, Green Cove at the entrance, and Snug Basin at the head, with from 9 to 15 fathoms water. *Limestone* of a very fine quality is to be procured at the head of the harbour, and *coal* has been found.

Green Cove, just within the entrance on the North side of the harbour, affords a snug, well-sheltered anchorage in 9 to 14 fathoms. Harbour Island, off its South side, and completely landlocking the anchorage in that direction, is of small extent, with a clear deep passage on either side into the anchorage. A rock lies half a cable off its S.E. point.

This anchorage is convenient as a stopping-place for vessels bound to or from Stamp Harbour at the head of Alberni Inlet, and the entrances to it, on either side of Harbour Island, make it available to sailing vessels or steamers.

Steamer Passage, on the East side of Harbour Island, leads into Green Cove. It should only be used by steamers, or sailing ships with a fair wind.

Ship Passage, which leads into Green Cove North of Harbour Island, is 4 cables long, and 2 cables wide, clear of danger, with from 11 to 20 fathoms, and available for sailing ships unable to enter or leave Green Cove by Steamer Passage.

On the North shore, one mile from Green Cove, is a large stream of fresh water, with a bank extending a short distance off it.

From Uchucklesit Harbour, the Alberni Inlet trends N.E. by E. for 3 miles, and is steep-to on both sides, after which it runs N. by W. to the head.

Nahmint Bay, on the West side of Alberni Inlet, 10 miles within its entrance, is about half a mile in extent, with from 19 to 20 fathoms water, and may be used as a stopping-place, if working down the inlet; a large stream disembogues at its head.

The Second Narrows, 13 miles from the entrance of the inlet, are 3 cables wide at low water, steep-to on the West side, with 26 fathoms in mid-channel; if passing through them at high water, keep well over to the western shore.

The First Narrows, 18 miles from the entrance, are two cables wide at low water, steep-to on the East side; the West side dries out one cable at low water. The depth in mid-channel is 40 fathoms; and in going through them a vessel ought to keep well over on the eastern side.

Stamp Harbour, at the head of Alberni Inlet, is a capacious and secure anchorage, 2 miles in length, and varying in breadth from 4 cables to 1 mile. Its western shore is high and rocky, but the eastern side and head are low and fertile, with a quantity of clear level land, almost fit for cultivation. A stream of considerable size, the *Sumass River*, flows into the harbour at the head, and is navigable for canoes several miles. It has its source in a chain of extensive lakes in the interior of Vancouver Island, and the quantity of water discharged from it is so great that there is a constant current out of the inlet, often exceeding 1 knot in strength.

An extensive saw-mill has been built on the East side of Stamp Harbour, and a small settlement formed, composed mostly of the workmen connected with the establishment. Great quantities of the finest timber in the world for spars are exported from this place, and vessels of considerable size may lie close to the saw-mill without grounding, as there are 4 fathoms almost alongside it. The anchorage in the harbour is in 8 to 12 fathoms, at the distance of three-quarters of a mile from the head, with Observatory Islet S.W. and the saw-mill North.

Observatory Inlet, in the centre of the harbour, is a small bare rock about 6 feet above high water. Some rocks extend half a cable North of it, but may be approached within one cable. It is in lat. $49^{\circ} 13' 46''$ N., long. $124^{\circ} 50'$ W.

Directions.—In entering Barclay Sound through the Eastern Channel, the

S.E. entrance point, Cape Beale, may be easily recognized from the S.E., by the islands West of it, Ship Islet being also very conspicuous from the trees on its North part. In approaching or rounding the cape, do not come nearer than half a mile to avoid the rocks off it, until Turn Island at the North part of Eastern Channel is well shut in by Leading Bluff, Tzaartoos Island, N. by E. $\frac{3}{4}$ E., when steer up the Eastern Channel with that mark on, which will lead clear of the rocks off the West side of Cape Beale, and East of Channel Rocks. When Ship Island bears W.S.W., the vessel will be well North of the latter, and may then steer up mid-channel about N.N.E.; on nearing Leading Bluff, keep the East side of Hill Island open South of it S.W. $\frac{1}{4}$ S., to pass East of the Fog Rock, until the West side of Nob Point comes open East of Limestone Point N. $\frac{1}{4}$ W., when steer up within 2 cables of either shore, or in mid-channel. If bound to Stamp Harbour, after entering the Alberni Inlet, the only direction required is to keep mid-channel, and anchor on the eastern side of the harbour, with the bearings already given.

After entering the Alberni, a strong southerly wind will generally be experienced, blowing home to the head; it however usually falls a little during the night.

A steam-tug is attached to the saw-mill establishment, for the purpose of towing vessels through the Eastern Channel; when a vessel is expected the tug generally lies in Dodger Cove, at the entrance of Middle Channel, where a good look-out can be kept.

If beating into the Eastern Channel, which ought only to be done by small or quick working vessels, when standing towards Cape Beale, tack before the passage between Turn Island and the main comes open of Leading Bluff N.N.E. Ship Islet may be approached to a quarter of a mile; when nearing King Island, or the Channel Rocks, tack when Turn Island comes shut in with Leading Bluff. As a rule, in standing towards the East shore do not come within 2 cables, and after passing the Channel Rocks, keep outside of the line of Deer Islands. On nearing Leading Bluff and Fog Rock, keep Hill Island open of the former S.W. $\frac{1}{4}$ S. till Nob Point comes well open of Limestone Point N. $\frac{1}{4}$ W., which clears the Fog Rock to the South and N.E. In standing into Numukamis Bay, give Reef and San Jose Islands a berth of about 2 cables, after which the shore on either side may be approached to about a cable, except near the centre of Numukamis Bay, which should not be approached closer than half a mile.

If necessary to anchor for the night, or from other causes, Entrance anchorage, in the Deer Group, just North of Helby Island, is recommended, being secure, and easy of access from either Eastern or Middle Channels. Kelp, Sproat, and Nahmint Bays, also Green Cove, are easy of access, and may be used as stopping-places.

MIDDLE CHANNEL, the largest passage into Barclay Sound, is adjacent to the Eastern Channel, and separated from it by the Deer Islands. It is

upwards of 12 miles long in a N.N.E. direction, and 3 miles wide in the narrowest part, being bounded on either side by numerous small islands and rocks. The soundings within it vary from 30 to 54 fathoms, and off its entrance are three dangers, named Western Reef, Channel Reef, and Danger Rock, which only break in heavy weather, and require great caution to avoid. In southerly or south-westerly gales there is generally a very heavy sea in this channel.

Danger Rock, in the S.E. part of entrance of Middle Channel, $3\frac{1}{2}$ miles W. $\frac{1}{2}$ N. from Cape Beale, and S.W. by W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from Ship Islet, of small extent, and only breaks in heavy weather. There are from 22 to 40 fathoms at a distance of 2 cables around it. Swiss Boy Island just open West of Entrance Island N.N.E. leads half a mile East of Danger Rock; Mark Islet open North of Ragged Island N.E. leads the same distance West of it, and East of Channel Reef; and Sail Rock in sight West of Storm Island N.W. by W. $\frac{1}{2}$ W. leads South of it and Channel Reef.

Channel Reef lies near the centre of the entrance of Middle Channel, $3\frac{1}{2}$ miles W. $\frac{3}{4}$ S. from Ship Islet, and $1\frac{1}{2}$ mile W.N.W. from Danger Rock. It is about a cable in extent, uncovers at low water, and has 27 fathoms close to on the eastern side; there are from 19 to 50 fathoms in the channel between it and Danger Rock, and the same marks clear both of them.

Western Reef lies in the S.W. part of entrance of Middle Channel, $5\frac{1}{2}$ miles W. $\frac{3}{4}$ S. from Ship Islet, and 1 mile South of the Broken Group; it is about a cable in extent, awash at low water, and should not be approached within half a mile.

In bad weather the sea breaks heavily over all these reefs.

Entrance Island, at the S.E. point of Middle Channel, and nearly 1 mile W.N.W. from Ship Islet, is of small extent, and wooded. It is steep-to and clifty on the South and West sides.

Hecate Passage, leading into Middle Channel between Entrance Island and Danger Rock, is 2 miles wide, with from 33 to 74 fathoms water, and the best way to enter Middle Channel in thick weather, or from the South or East. *Shark Pass*, between Entrance and Ship Islands, is two-thirds of a mile wide, with from 14 to 25 fathoms in the middle, and may be used by steamers or sailing vessels with a fair wind.

Dodger Cove, on the East side of Middle Channel, between Diana and King Islands, is a narrow creek about two-thirds of a mile long and a cable wide, with several rocks and small islets off its entrance. It affords good shelter to coasters or small craft at its head, but it should not be attempted by a stranger.

Satellite Pass, 3 miles from Entrance Island, lies between Helby and Hill Islands, connecting the Eastern and Middle Channels. Its length is about a mile, and breadth half a mile; the soundings in the middle vary from 9 to

22 fathoms, and the South side is clear of danger, but 3 cables South of Hill Island, on the N. side of the pass is a shoal patch with $3\frac{1}{2}$ fathoms, marked by kelp. Leading Bluff open of East side of Hill Island N.E. by N. leads to the S.E. of this shoal.

A vessel bound to Alberni Inlet, after having entered Middle Channel, should proceed through this pass into the Eastern Channel, and on to the inlet through the latter, keeping about 1 or 2 cables North of Ragged, Helby and Wizard Islands.

Village Rocks, lying on the East side of Middle Channel, 6 miles from Entrance Island, and one-third of a mile from the N.W. point of Robbers Island, are 2 cables in extent, nearly awash at low water, and usually break in heavy weather. They should not be approached within a quarter of a mile.

Chain Islands, on the East side of Middle Channel, are a chain of small islets and rocks nearly 4 miles long in a northerly direction. They run parallel to the West side of Tzaartoos Island, being separated from it by a passage three-quarters of a mile wide, but filled with rocks, and among which no vessel should enter.

Swiss Boy Island, the southernmost of this group, is small and clifty, and 2 cables West of it is *Bull Rock*, of small extent, with less than 2 fathoms water, which breaks in bad weather. A vessel ought not to approach the West side of these islands within half a mile, except when rounding their North part.

JUNCTION PASSAGE, at the N.E. part of Middle channel, connecting it with the Alberni Inlet and Eastern Channel, lies North of the Chain and Tzaartoos Islands, between them and the main. It is 2 miles long in an easterly direction, about one-third of a mile wide, its shores are clear of danger, and the soundings in mid-channel vary from 50 to 84 fathoms. On the North side of the passage is Rainy Bay, about $1\frac{1}{2}$ mile in extent; but there are several rocks and small islets within it, the shores are rugged and broken, and the water too deep to afford anchorage. Northward of this bay, and connected to it by a very narrow boat pass, is Useless Inlet, a large sheet of water with from 9 to 20 fathoms, which no vessel can enter.

BROKEN GROUP, which forms the boundary of Middle Channel along the West side, is composed of a number of small islands and rocks, covering a space upwards of 6 miles long and 4 miles wide. They are low, and the principal ones wooded, the largest being about a mile in extent; there are several passages through them, and a good anchorage, called Island Harbour, in their N.E. part, but as a rule no stranger should venture among them or approach within half a mile, as the soundings are irregular, and there may exist rocks besides those marked on the Admiralty charts.

Redonda, the S.E. island of this group, lies at the S.W. entrance point of Middle Channel, $4\frac{1}{2}$ miles W. $\frac{1}{2}$ N. from Ship Islet. It is small, wooded, and

of a round shape; some rocks extend 3 cables off its S.E. point, and half a mile E.N.E. of it is a reef which covers at half-flood. Between Redonda Island and Channel Reef is a passage 1 mile wide, with from 19 to 33 fathoms, but it should not be attempted by a stranger.

Village Island, the largest of the group, is $1\frac{1}{2}$ mile North of Redonda, and upwards of a mile in extent; the East side is bold and cliffy. On its North side is a village of considerable size, and where landing may be effected in almost all weather.

Coaster Channel, which runs in a westerly direction through the Broken Group, North of Village Island, is about 4 miles long, and from half a mile to 1 mile wide, with from 10 to 24 fathoms; but as there are several rocks within it, this channel should not be attempted by a stranger.

Village Reef, in the East part of Coaster Channel, half a mile North of Village Island, is small, and 4 ft. above high water; there are 34 fathoms at 3 cables East of it.

Island Harbour, in the N.E. part of Broken Group, and 5 miles from the entrance of Middle Channel, is a good, well-sheltered anchorage, about half a mile in extent, with from 10 to 14 fathoms water; it is formed by several rocks and islands, and there are two good passages into it from the Middle Channel, *Protection Island*, off its East side, and protecting it in that direction, is two-thirds of a mile long, and narrow. *Elbow Islet*, 3 cables S.S.W. from Protection Island, is small and rugged, with a notch in the centre; the islet is conspicuous from the southward. *Elbow Rocks*, which cover at two-thirds flood, lie $1\frac{1}{2}$ cable N.N.E. of Elbow Islet, between it and Protection Island, and are steep-to on all sides. *Pinnacle Rock*, 3 cables East of Elbow Islet, almost in the fairway of the South entrance, only breaks in heavy weather, and is dangerous to vessels entering the harbour by that passage.

Island Harbour may be entered either by the South or by the Harbour Entrance. The South entrance, between the Elbow Rocks and Protection Island, is $1\frac{1}{2}$ cable wide at its South part, with from 9 to 14 fathoms water. Harbour Entrance, along the North side of Protection Island, between it and Gibraltar Island, is nearly a mile long, and its breadth averages about 2 cables. The soundings within it vary from 15 to 18 fathoms, and in the middle, 4 cables from its East end, lies the Channel Rock, of small extent, with only 9 feet on it at low water.

The best anchorage is near the centre of the harbour, about 2 cables West of the N.W. end of Protection Island, in from 10 to 12 fathoms, protected by Puzzle and Mullins Islands from the westward.

No one should attempt to enter this harbour without the chart, unless thoroughly acquainted with the place; and it only ought to be entered by sailing vessels with a fair wind.

Nettle Island, the north-east island of Broken Group, is nearly 1 mile in extent, steep-to off its North side, but East and West of it some islets and

rocks extend out half a mile. At half a mile East of its East point is a small bare rock 8 feet above high water, named *Suale Rock*, which is very conspicuous from the Middle Channel, and marks the East entrance of Seshart Channel.

SESHART CHANNEL is North of Broken Group between it and the main, and connects the Western and Middle Channels. It is a winding channel 5 miles long in a westerly direction, and about half a mile wide; the soundings in it vary from 16 to 35 fathoms, and a mid-channel course through is free of danger.

Capstan Island, 3 miles from the East entrance, and nearly in the middle of this channel, is small, and the southernmost of a number of small islands, extending nearly 1 mile from the North shore. Westward of these islets is an extensive village called *Seshart*, to the southward of which a vessel may anchor a quarter of a mile off shore.

Bird Islets are two small, bare, conspicuous rocks lying almost in the centre of the North part of Middle channel, 9 miles from the entrance; the southern islet is 35 feet, and the northern 30 feet above high water.

Effingham Inlet, the entrance to which is in the N.W. part of Middle channel, is narrow, and about 8 miles long in a curved direction to the N.W., terminating in a low swamp; its shores on both sides are high and rocky, the western one indented by several bays. The soundings in it vary from 35 to 70 fathoms, and there is no anchorage.

Vernon Bay, 1 mile East of Effingham Inlet, at the head of Middle Channel, is upwards of a mile in extent, open to the southward, and too deep to afford anchorage; its shores are high and rocky. At 3 cables off Palmer Point, its S.W. extreme, is a rock 3 feet above high water.

The North shore of Middle Channel is rocky and bold, rising in some places to mountains upwards of 3,000 ft. high; it is steep-to, and clear of danger; in southerly winds the sea breaks violently along it.

DIRECTIONS.—Entering Barclay Sound by the Middle Channel with a fair wind, and coming from the West or S.W., keep well clear of the western part of the Sound, and 3 miles South of Broken Group. Steer towards Ship Islet on an E.N.E. bearing, until Mark Islet comes open North of Ragged Island N.E., when haul into the Middle Channel with that mark on which will lead midway between Channel Reef and Danger Rock; when Ship Islet bears E. by N. the vessel will be clear North of them, and may then steer up mid-channel. If bound to the Alberni Inlet, a sailing vessel ought to proceed through Satellite Pass into the Eastern Channel (as the wind is generally unsteady in Junction Passage), proceeding according to the directions given in page 335 for the latter channel. Should it, however, be requisite to go through Junction Passage, give the Chain Islands a berth of nearly half a mile to avoid the rocks off them, and steer in mid-channel through the passage into Alberni Inlet.

North Pacific.

Unless intending to go through Satellite passage, do not approach the Deer Island within half a mile.

If entering Middle Channel from the eastward, or in thick weather, and not able to see the marks for clearing the reefs, keep well out until Entrance Island bears North, when steer through Hecate Passage so as to pass 2 or 3 cables West of the island, which will lead well eastward of all danger, then proceed as before directed.

Beating into Middle Channel, when South of Danger Rock and Channel Reef, keep Sail Rock (which lies off the S.W. side of Broken Group, and is very conspicuous) open South of Storm Island, the southernmost of the group, N.W. by W. $\frac{1}{2}$ W., until Mark Islet comes nearly on with the S.E. point of Hill Island N.E. $\frac{1}{2}$ E., when, if standing to the westward, tack; in standing to the eastward avoid shutting in the passage between Hill and Ragged islands; tacking when these latter marks are on will lead between Danger and Channel Reefs, and clear of them; when Ship Islet bears East, a vessel will be northward of them, and may stand over to about half a mile of the Deer Islands, and a mile of the Broken Group. If bound to Alberni Inlet, when able to lay through the Satellite Pass, do so, keeping nearer to its South shore, and beat up to the former through the Eastern Channel. No vessel should attempt to beat through Middle Channel unless the weather be clear and the marks well made out.

WESTERN CHANNEL leads into Barclay Sound westward of the Broken Group, between it and Great Bank. Its length is about 4 miles in a northerly direction, its breadth from 1 to 2 miles. *Sail Rock*, lying off the S.W. part of Broken Group, is a bare rock like a sail, rising 100 feet above the sea, and very conspicuous. *Shag Rock*, 8 feet above high water, on the East side of the channel, $2\frac{3}{4}$ miles N. $\frac{1}{4}$ W. from Sail Rock, and half a mile West of the Broken Group, is small and bare, and foul ground exists 1 cable from it. *Round Island*, near the middle of the North part of the channel, is small, but 200 ft. high; it lies $3\frac{1}{4}$ miles N. by W. from Sail Rock.

Black Rock, at the S.W. entrance point of the Western Channel, $3\frac{1}{4}$ miles S.W. by W. $\frac{1}{2}$ W. from Sail Rock, is 10 feet above high water, and small; some rocks which break extend 2 cables East of it.

Channel Rock lies at the S.E. extreme of the Great Bank, on the West side of the channel. It is bare, 15 feet above high water, and steep-to on its eastern side. *Great Bank* is, within the 10-fathom edge, $2\frac{1}{4}$ miles long in a northerly direction, and its greatest breadth is $1\frac{1}{2}$ mile; on the shoalest parts, near the North and S.W. ends, are from 3 to 4 fathoms, marked by kelp, over which in heavy gales the sea breaks.

Directions.—The Western Channel, though clear of danger and wide, ought only to be used by steamers, or sailing vessels with a fair wind, and not then unless bound to Toquart Harbour, in the north-western part of Barclay Sound. In entering, give the Sail and Black Rocks a berth of

half a mile, and steer up mid-channel, passing half a mile West of Round Island.

Peacock Channel runs through the N.W. part of Broken Group in a N.E. direction from the Western to Seshart Channel. It is about 3 miles long, and nearly a mile wide, with from 20 to 30 fathoms; its West side is clear of danger, but on its East side, $1\frac{1}{2}$ mile within the West entrance, and 2 cables West of Puzzle Island, lies *Galley Rock*, which uncovers at low water, and has 22 fathoms 1 cable S.W. of it. This channel is fit for steamers, or sailing vessels with a fair wind.

Hand Island, the N.W. of the Broken Group, and at the S.W. entrance point of Seshart Channel, is small and rugged; foul ground exists off its East and West sides, which should not be approached within 3 cables. *Lyll Point*, at the N.W. extreme of Seshart Channel, on the main, and a mile N.W. by N. from Hand Island, is a low sharp point.

Mayne Bay, northward of Lyall Point, is of an oblong shape, 2 miles long and one mile deep. Its shores, except near the North part, are low, and steep-to, the soundings vary from 20 to 25 fathoms, and there is no anchorage except in its south-east corner, where there is a limited spot with 14 fathoms about 2 cables off shore; the group of small islets, the *Sisters*, extending South 5 cables off the N.W. point, may be approached to a cable.

Stopper Islands, lying half a mile West of Mayne Bay, are about $1\frac{1}{2}$ mile in extent, wooded, and 200 ft. high; rocks extend from 2 to 3 cables off their East and West sides.

David Channel, leading into Toquart Harbour between Mayne Bay and the Stopper Islands, is about 2 miles long in a northerly direction, 3 cables wide in its narrowest part, and the soundings in it vary from 17 to 22 fathoms. The *Richard Rock*, on its West side, 4 cables from the Stopper Islands, is steep-to on the East side, and may be approached to a cable's distance; a vessel should not go between this rock and the islands.

Toquart Harbour, in the N.W. corner of Barclay Sound, 9 miles from the entrance of Western Channel, is about $1\frac{1}{2}$ mile in extent, and well sheltered by the Stopper Islands from all winds. The anchorage is of considerable extent, in from 12 to 14 fathoms, muddy bottom.

Village Passage leads into the harbour westward of Stopper Islands; it is upwards of a mile long, and clear in mid-channel.

Pipestem Inlet is a long narrow inlet, extending upwards of 5 miles nearly straight in a north-easterly direction from the north-east part of Toquart harbour. It has 19 to 37 fathoms water, but affords no anchorage whatever; its shores are rocky, and rise abruptly to 1,000 and 2,000 feet above the sea; at its head is a small patch of swampy ground, some fresh-water streams flowing through it.

The West Coast of Barclay Sound from Toquart Harbour to Ucluelet

Arm runs nearly straight about S.S.W. and N.N.E., and rises gradually to high land 2,000 feet above the sea. For $2\frac{1}{2}$ miles from the Stopper Islands a chain of small islands run parallel to the coast at a distance of about three-quarters of a mile off, with from 5 to 7 fathoms between them and the shore. Forbes Island, the southernmost of them, is moderately high, steep-to on its South side; nearly a mile S.W. from it, and extending from the opposite shore, are a number of rocks above high water.

Ship Channel, between the Vancouver shore and the Great Bank, southward of Forbes Island, leads into the Ucluelet Arm, and is clear of danger. It is 4 miles long N.N.E. and S.S.W., two-thirds of a mile broad in its narrowest part, and the soundings vary from 26 to 38 fathoms. *Double Island*, at its S.E. point, is of small extent, steep-to on the West side, but from the South and East sides foul ground extends upwards of a mile. *Kelp Inlet*, 6 cables N.W. of Double Island, on the opposite side of the channel, is low and bare; kelp extends 2 cables South of it.

Ugly Channel, to the eastward of Shelter Islands, connects Ship Channel with the ocean. It is bounded on both sides by rocks and reefs, and though probably deep, it has not been sufficiently examined to recommend its being used by a stranger; the soundings in the North part vary from 28 to 36 fathoms. *Starlight Reefs*, at its S.E. part, are a cluster of rocks about 7 cables in extent, some above high water; in bad weather the sea breaks heavily over them.

Look-out Island, on the West side, is nearly bare, of small extent, and about 150 feet high; at 3 cables South of it is a patch of rocks 2 cables in extent, and 6 cables North of it lies a bare rock, 6 feet above high water.

UCLUELET ARM, just within the S.W. entrance point of Barclay Sound, is narrow, and extends $5\frac{1}{2}$ miles in a N.W. by W. direction, running parallel to the outer coast, and separated from it by a narrow peninsula. Its South shore is low, and indented by several small creeks and bays; the northern shore is nearly straight, and, at a short distance inland, rises gradually to a flat-top range of considerable height, the S.E. shoulder of which, *Mount Ozzard*, is 2,275 feet high, and conspicuous from the S.E.

The soundings in this arm vary from 4 to 8 fathoms, and there is secure and well-sheltered anchorage from 1 mile inside the entrance to the head.

Shelter Islands, upwards of half a mile S.E. of the entrance of the Ucluelet arm, are an irregular cluster of small islets and rocks, about a mile long in a north-westerly direction, and 3 cables wide, which completely shelter the arm from the sea. *Centre Reef*, 3 cables westward of their northern part, is of small extent, and about 3 feet above high water.

Carolina Channel, West of Centre Reef, between it and Amphitrite Point, the S.W. point of entrance to Barclay Sound, is the westernmost passage into the latter and the Ucluelet arm. This channel appears to be the best or a stranger to use if entering the Ucluelet arm from seaward.

Leading Point, on the South side of the Ucluelet arm, 6 cables within the entrance, is bold and steep-to. At *Leading Point* the breadth of the arm contracts to a cable. *Stewart Bay*, on the North side, half a mile within the entrance, is 2 cables deep, and half a mile wide. In its centre is a rock awash at high water, and the bay is too shallow to afford anchorage. There is a native village of considerable size in its West part. *Channel Islet*, in the middle of the arm about 2 miles within the entrance, and a mile past *Leading Point*, is small; between it and the latter is good anchorage in from 6 to 9 fathoms.

To the westward of *Channel Islet* the arm becomes wider, affording good anchorage in 4 to 7 fathoms, over a space one mile long and half a mile wide.

There are several channels leading into the Ucluelet arm, with apparently deep water through them, but there are so many rocks and dangers in their vicinity, that even with the chart great vigilance on the part of a stranger is recommended, and it would hardly be advisable to enter without a pilot.

The Coast from *Amphitrite Point* takes a W. by N. direction for 17 miles to *Point Cox*. It is low, and indented by two large sandy bays, which afford no shelter. *Wreck Bay*, 4 miles westward of *Amphitrite Point*, is nearly 3 miles wide, and 1 mile deep. It is totally unfit for anchorage. A Peruvian vessel, the *Florentia*, was wrecked here in December, 1860.

Long Bay, 8 miles westward of *Amphitrite Point*, is 7 miles wide, and upwards of a mile deep, with from 8 to 11 fathoms between the entrance points. There are several rocks within it, and no vessel ought to anchor here.

Portland Point, the N.W. extreme of *Long Bay*, is high and abrupt, with some small rocks and islets around it, at a distance of half a mile. *Gowland Rocks*, $1\frac{1}{2}$ mile W.S.W. from it, are of small extent, bare, and from 10 to 15 feet above high water. They ought not to be approached nearer than a mile.

CLAYOQUOT SOUND comprises a number of inlets, islands, and rocks, covering an area 30 miles long in a westerly direction, and 16 broad. The entrance to it is fringed by numerous dangerous rocks, which require due caution to avoid; it lies between *Cox* and *Sharp Points*, bearing from each other W. by N. $\frac{1}{4}$ N. 21 miles, and is distant 20 miles W. by N. from *Barclay Sound*, and 66 miles W.N.W. from *Cape Flattery* lighthouse.

There are several channels into the inner waters of this sound, but with the exception of *Ship Channel*, they ought not to be attempted by a stranger.

It is high water, full and change, in *Clayoquot Sound* at 12 hours, the rise and fall being about 12 feet.

POINT COX, at the S.E. extreme of *Clayoquot Sound*, is rocky, and may be approached to half a mile. A remarkable summit, *Vargus Cone*, 435

feet high, rises just within the point, and is very conspicuous from the westward.

Templar Channel, the eastern entrance of the sound between Low Peninsula on the East, and Leonard, Wakennenish, and Stubbs Islands on the West, is a winding passage about 4 miles long, in a N.N.W. direction, with an average breadth of half a mile. No vessel drawing more than 12 feet water ought to attempt to enter this sound by this channel, and not even then without a pilot, as it is very intricate, and no directions can be given.

Broken Channel, between Wakennenish and Vargas Islands, to the westward of the former, is upwards of 2 miles long in a northerly direction, and half a mile wide in its narrowest part, with from 6 to 15 fathoms water. Several rocks lie off its entrance, and on both sides. The tide runs through from 2 to 5 knots, and no vessel ought to use it without a pilot. *McKay Reef*, lying off the entrance, 4 miles W. by N. from Cox point, is of small extent, and 5 to 10 feet above high water; the sea generally breaks heavily over it. Two-thirds of a mile North of this reef is the *Passage Rock*, which covers at high water.

Vargas Island, on the West side of Broken Channel, is $4\frac{1}{2}$ miles long, $4\frac{1}{2}$ at its broadest part, and its surface is low and undulating. On the eastern side, near the middle, is a native village called *Kelsemart*; and at half a mile from the South shore, running parallel to it, is a chain of small islets and rocks called the Rugged group.

Ship Channel, to the westward of Vargas Island, between it and a number of small islands and rocks, is the only passage into Clayoquot Sound which ought to be attempted by a stranger. Its entrance lies nearly 11 miles westward of Cox Point, and the channel is 5 miles long in a N.N.E. direction, with a breadth varying from three-quarters to $1\frac{1}{2}$ mile. The soundings in the South part vary from 20 to 22 fathoms, decreasing to $5\frac{1}{2}$ fathoms in the shoalest part near the North end. The tide runs through it from 1 to 2 knots.

Bare Islet, at the S.E. entrance point of the channel, is small, rising to a summit 40 feet high in the centre, and forms a good mark for identifying Ship Channel. A rock which breaks lies 5 cables E. by S. from it, but there are 20 fathoms within half a mile of its S.W. side. *Plover Reefs*, on the East side of the channel half a mile N.W. of Bare Island, are of considerable extent, stretching 1 mile from the West side of Blunden Island, and some parts are 6 feet above high water. *Hobbs and Burgess Islets* lie at the N.E. part of the channel, 2 cables from the West side of Vargas Island, and nearly connected with it at low water.

Sea Otter Rock lies at the S.W. entrance point of Ship Channel, 2 miles W. by N. from Bare Islet. It is very small, and only 6 feet above high water. *Shark Reefs*, some of which cover, others 6 feet and 10 ft. above high water, lie on the West side, 2 miles N.E. by N. of Sea Otter Rock. They

are about 3 cables in extent, and should not be approached nearer than 2 cables on their South and East sides.

Lawrence Islets, on the West side, nearly 3 miles from Sea Otter Rock, are small, low, and wooded. *Bartlett Island*, half a mile to the westward of the Lawrence Islets, is low and wooded; its shores are much broken, and ought not to be approached within a quarter or half a mile.

Hecate Passage, to the N.E. of and connecting Ship Channel with the inner waters of the sound, is 3 miles long in an E.N.E. direction between Vargas Island and the main shore of Vancouver, and upwards of a mile wide. There are several rocks on both its shores, and a sand-bank in its centre, but to the southward of the bank along the North shore of Vargas is a clear passage with not less than $5\frac{1}{2}$ fathoms.

Half-tide Rock, off the S.W. point of Hecate Passage, and 2 cables from Vargas Island, is of small extent, covers at half-flood, and may be approached to 1 cable on the outside.

The *Cut-face Mountains*, rising on the main shore of Vancouver and fronting the Ship Channel, are a remarkable flat-topped range, nearly 3,000 feet high, with some patches of cliff and bare rock on their South side. They are very conspicuous from seaward.

Deep Pass, between two islands at the N.E. part of Hecate Passage, is about 3 cables long and $1\frac{1}{2}$ cable wide, with 9 fathoms water, and is the best channel leading from Hecate Passage into the inner waters. The tide runs from 2 to 3 knots through it. *Hecate Bay*, 2 miles North of Deep Pass, on the West shore, is 6 cables wide and 3 cables deep, with from 9 to 10 fathoms. It is clear of danger, and one of the best anchorages within the sound, being easy of access, and well sheltered. There is a stream of fresh water in the middle of the bay, very convenient for watering.

Observatory Islet, at its North point, is 35 feet high, and bare. It is in lat. $49^{\circ} 15' 22''$ N., long. $125^{\circ} 58' 10''$ W.

Cypress Bay, on the main shore of Vancouver, and 4 miles North of Deep Pass, is nearly 2 miles in extent, with from 12 to 26 fathoms. There is good anchorage in 12 fathoms near its North part, at a distance of half a mile from the shore. It is open to the southward, but no sea rises. *Mussel Rock* lies 4 cables off the East shore of the bay, and half a mile N.N.W. $\frac{3}{4}$ W. of the East extreme. It is of small extent, and covers at three-quarters flood.

Meares Island, within the eastern part of Clayoquot Sound, adjacent to and N.E. of Vargas Island, is 6 miles extent in a northerly and 7 miles in an easterly direction. Its shores, except on the North side, are high and rugged, and there are several summits on the East and West sides upwards of 2,000 feet above the sea; one on the latter side, named *Lone Cone*, is 2,331 feet high, and very conspicuous from seaward near the entrance of Ship Channel. An extensive inlet runs nearly through the island from the South side to North, and there are several other bights and bays.

Deception Channel, between Meares and Vargas Islands, is about 3 miles

long North and South, and half a mile wide, with irregular soundings from 5 to 20 fathoms. The tide runs from 2 to 5 knots through this channel, and a stranger should not attempt its navigation.

Ritchie Bay, on the N.W. side of Meares Island, 2 miles eastward of Deep Pass, is a mile wide, half a mile deep, and affords anchorage in 5½ to 10 fathoms at 2 cables off its eastern shore. The shores of the bay are rocky, but have no outlying dangers.

If wishing to anchor in Ritchie Bay, and coming from Deep Pass, proceed to the eastward so as to pass about 1 cable North of Robert Point, and keeping the same distance off the South shore, steer into the bay, anchoring in 5 or 7 fathoms about 2 cables from its East side, with the extremes bearing North and S.W. ½ W.; entering from the northward, steer midway between Saranac Island and the North point of the bay.

The North shore of Meares Island is low, nearly straight, and steep-to; it takes an E. by N. direction for nearly 4 miles, and then turns sharply to the S.E.

Bedwell Sound, the entrance to which is 1½ mile West of Cypress Bay and northward of Meares Island, is 7 miles long in a northerly direction. The shores are high and rugged, rising on the East side to sharp jagged peaks from 2,000 to 4,300 feet above the sea. *Race Narrows*, East of Bedwell Sound, between the North side of Meares Island and the main, are 1½ mile long, and about 2 cables wide in the narrowest part. The tides run through them from 3 to 4 knots. *Warn Bay*, to the eastward of Race Narrows, and 1 mile from the N.E. part of Meares Island, is upwards of 2 miles long. The shores on both sides are high, but low at the head, from whence issue several streams, and a sand-bank dries out upwards of a cable.

Fortune Channel, between the East side of Meares Island and the main, is 5 miles long, North and South, and varies in breadth from 3 cables to 1½ mile; its shores are high, and there are several off-lying rocks on its West side near the middle. The soundings vary from 30 to 75 fathoms.

Mosquito Harbour, on the East side of Meares Island, is narrow, and about 2 miles long in a north-westerly direction. There are several rocks and small islets off its entrance, but it affords good anchorage inside in from 4 to 7 fathoms. The entrance is 1½ cable wide, with 11 fathoms, and the harbour is well adapted for a steamer.

In entering Mosquito Harbour, round Plover Point at a cable's distance to avoid the *Hankin Rock*, and keep midway between Wood Islands and the East shore. A vessel may enter westward of the Wood Islets by keeping midway between them and the shore.

Dark Island, 7 cables South of Plover Point, on the West side of Fortune Channel, is small. Some rocks extend a short distance off its West side, but there is a clear passage between it and the West shore.

Double Island, 5 cables South of Dark Island, is small and steep-to. There are 24 fathoms in the passage between it and Meares Island.

Deception Pass, at the South extreme of Fortune Channel, and connecting it with Tofino Inlet and Browning Passage, is a winding channel to the S.S.E., about $1\frac{1}{2}$ mile long and 2 cables wide. It is free from danger in mid-channel, and the tide sets with considerable strength through it.

TOFINO INLET, in the eastern part of Clayoquot Sound, is about 10 miles long in a northerly direction, and varies in breadth from one-half to $1\frac{1}{2}$ mile. Its shores are high and rocky, indented on the West side by some large creeks, and there is no anchorage, except near the entrance on the West side. *Indian Island*, on the South side of entrance, and half a mile south-east from Deception Pass, is about a mile in extent, and steep-to on the North side.

Warn Island, nearly 1 mile North of Indian Island, off the West side of the inlet just within the entrance, is upwards of half a mile in extent, and steep-to on all sides. *Island Cove*, half a mile West of Warn Island, is of small extent, with from 8 to 10 fathoms in the middle, and completely landlocked. *Gunner Harbour*, on the West side of the inlet, just North of Warn Island, is $1\frac{1}{2}$ mile long in a N.N.W. direction, but narrow. The harbour becomes shoal towards the head. *Tranquil Creek*, on the West side of the inlet, and 4 miles North of Warn Island, is narrow, and upwards of a mile long. The creek is too deep for anchorage.

Flat-top Islets, 5 miles from the entrance of the inlet, and $2\frac{1}{2}$ cables from its West shore, are steep-to on the East side, there being 47 fathoms at a cable's distance from them. Northward of these islets the inlet takes a winding direction to the northward. On the East side of Tofino Inlet, 4 miles from the entrance, is a stream of considerable size, said to communicate with an extensive lake.

Browning Passage, on the South side of Meares Island, connecting Tofino Inlet with Templar Channel, is 5 miles long in a westerly direction, and less than half a mile broad. Its East end is only $1\frac{1}{2}$ cable wide; there are several rocks off the West entrance, and no stranger, except with a small vessel, should attempt it.

North Channel, to the westward of Ship Channel, and separated from it by a number of small islands and rocks, runs along the S.E. side of Flores Island in a north-easterly direction. It is 4 miles long, and half a mile wide in the narrowest part. Both sides of the channel are bordered by innumerable rocks, and it is not recommended for a stranger to use it. The sea generally breaks heavily along both sides of its outer part.

Flores Island, in the western part of Clayoquot Sound, between North Channel and Sydney Inlet, is nearly 7 miles in extent, and of a square shape. It is low on the South and East sides, but high on the North and West, rising in some places to 3,000 feet. The shores are rugged and broken, and there are several off-lying rocks along its South and West sides. As a rule its outer part ought not to be approached nearer than 2 miles. *Rafael Point*, the South extreme of Flores, is cliffy, and of moderate height. Some

rocks extend 2 cables off it, and the point ought not to be rounded within half a mile. From thence the West coast of the island turns suddenly to the N.N.W., and continues in that direction for 7 miles, being indented by several small bays.

Sydney Inlet, at the West end of Clayoquot Sound, is 10 miles long in a N.W. by N. direction, and varies in breadth from a half to 1 mile. Its entrance is $3\frac{1}{2}$ miles N.W. by N. from Rafael Point, between the West side of Flores Island and the main of Vancouver. At 4 miles from the head are two small branches about 2 miles in length, one extending North, the other S.W. The shores are high and rugged, rising abruptly from the sea to 2,000 and 3,000 feet. The depth in the entrance is 15 fathoms, increasing gradually towards the head, and there is no anchorage. *Sharp Point*, the S.W. point of entrance to Sydney Inlet and S.W. extreme of Clayoquot Sound, is low and rocky, and may be approached to a cable's distance.

Refuge Cove is just West of Sharp Point, and separated from Sydney Inlet by a narrow peninsula. It runs in $1\frac{1}{2}$ mile in a N.N.W. direction, is from 1 to 2 cables wide, and affords good anchorage in 4 to 5 fathoms at half a mile within the entrance, well sheltered, and secure from all winds, though apparently open to the S.S.E.; the entrance, though narrow, is clear of danger. *Canoe Reef*, lying just S.W. of the entrance, and three-quarters of a mile westward of Sharp Point, is 2 feet above high water, but steep-to on the South and West sides. A sailing vessel, if embayed near this part of the coast, would find safety and shelter in Refuge Cove.

Shelter Arm branches off from the East side of Sydney Inlet to the N.E., along the North side of Flores Island for 5 miles, and then takes a N.E. by N. direction into the main for nearly the same distance, terminating in a narrow creek at the head. It is upwards of half a mile wide, 10 miles long, and the soundings vary from 40 to 90 fathoms in the South part. There is only one indifferent anchorage in it, just 2 miles within the entrance on the North side of Flores Island, in a small place named *Steamer Cove*. The shores of Shelter Arm are high, precipitous, and steep-to. The tide runs from 1 to 2 knots through it, the flood stream from the westward.

Obstruction Island, on the East side of Shelter arm, and separated from the N. point of Flores Island by a narrow pass, is about 2 miles in extent, and 700 feet high. Its shores are rocky and broken. *Rocky Pass*, on its South side, is narrow, about $1\frac{1}{2}$ mile long, and filled with rocks, so that no vessel could get through it.

North Arm, between the East side of Flores Island and the main, is about 8 miles long in a S.E. by S. direction, and its breadth is nearly 1 mile. Its shores are high in the South part, but decrease gradually to the southward. A vessel may anchor in from 5 to 8 fathoms abreast Base Point.

Matilda Cove, on the West side of North Arm, abreast the entrance to Herbert Arm, is a very narrow creek $1\frac{1}{2}$ mile long in a S.S.E. direction, but

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useless as an anchorage. *Base Point*, the S.W. entrance point to North Arm, is low and sandy, and there are from 2 to 3 fathoms at a cable's distance from it.

Herbert Arm, the entrance to which is on the East side of North Arm, about 2 miles from the South entrance of the latter, is 9 miles long, in a northerly direction, and its average breadth is about 1 mile. The shores are high, mountainous, and much broken; and there is no anchorage, except at the South part of its entrance. *Cone Island*, lying at the entrance of this arm, is about 1 mile in extent, 1,000 feet high, and steep-to on the South and West sides, but the passage into Herbert Arm North of it is blocked up by rocks and small islets. *Bawden Bay*, on the South side of entrance of Herbert Arm, and about $1\frac{1}{2}$ mile S.E. of Cone Island, is of small extent, and affords anchorage in 15 fathoms, near the centre; enter it in mid-channel. *White Pine Cove*, on the East side of Herbert Arm, nearly 3 miles from the entrance, is small, with a bank running off the head; a small vessel may anchor close to the edge of this bank in about 10 fathoms.

DIRECTIONS.—Entering Clayoquot Sound by Ship Channel (which latter will easily be recognised by Bare Islet, Sea Otter Rock, and a remarkable summit inland, the Lone Cone), round either Bare Islet or Sea Otter Rock at the distance of half a mile, and steer up the channel with the Twins Islands in line with the North summit of the Cat-face Mountains, bearing N.N.E. $\frac{1}{4}$ E. Keep the above-mentioned mark on till within half a mile of the Shark Reefs, when haul more to the eastward for the West extreme of Vargas Island, which may be rounded at a distance of 3 cables. If going on through Hecate Passage (page 343) into Hecate Bay, to clear Half-tide Rock keep Hobbs islet open West of Burgess islet S. by W. $\frac{1}{4}$ W. until the Twins come in line with the West Whaler Island W. by S., when steer up the passage with that mark on astern, which will lead North of Half-tide Rock and South of the North Bank. When past the latter, steer through Deep Pass, and anchor in Hecate Bay midway between its entrance points in 9 or 10 fathoms.

During heavy south-westerly gales the sea is said to break right across Ship Channel, between Lawrence and Hobbs Islands.

Although there are several apparently deep channels into Clayoquot Sound they are, with the exception of Ship Channel, so tortuous, and filled with rocks, that no stranger should attempt to enter by any. Intending to navigate the inner waters of the sound, which can only be done by a steamer or small craft, the chart will be found the best guide.

HESQUIAT HARBOUR, 8 miles westward of the West part of Clayoquot Sound, is formed at the bottom of the bay on the East side of Estevan Point. It is 4 miles long in a N.N.W. direction, and its breadth at the entrance is upwards of 2 miles, opening out a little inside, but on nearing the head it contracts to less than a mile. The soundings within the harbour vary from

4 to 8 fathoms, and there is a good secure anchorage in 7 or 8 fathoms at the distance of half a mile from the head; across the entrance, between Hesquiat Bluff and Estevan Point, is a sort of bar or ledge, about 3 cables wide with 4 fathoms water over it, which in a great measure prevents the sea from setting home into the harbour. Kelp grows more or less all over the anchorage in a depth of 5 fathoms.

Hesquiat Bluff, the East entrance point of the harbour, is a remarkable low wooded point with a shingle beach around it; a reef, which covers at a quarter flood, lies half a mile S.W. of it.

The shores of the harbour are generally low and wooded, and within the entrance at a distance of 2 cables clear of danger. At the head on the East side is Boat Basin, a small cove with 4 fathoms. There is a large freshwater stream there, and vessels may wood and water with great facility.

On the West side of the bay near Estevan Point are several indications of coal, and the land is apparently fertile.

Directions.—Hesquiat Harbour is easy of access to sailing vessels even with a foul wind. In entering either from the East or West, give the outer shores of the harbour a berth of more than half a mile, till past the bar, after which they may be approached to 2 cables; anchor in 7 or 8 fathoms near the centre of the harbour, about half a mile from the head.

In strong South or south-westerly gales the sea breaks heavily over the bar, but the anchorage is always safe, and landing is at all times practicable in Boat Basin.

The natives though friendly are much inclined to pilfering, and should be carefully watched.

ESTEVAN POINT, 15 miles W. $\frac{1}{4}$ N from Rafael Point, and 92 miles W. by N. from Cape Flattery, is a low wooded and projecting point. A ledge a mile wide extends nearly 1 mile off its S.W. side; and $1\frac{1}{4}$ mile off shore, and nearly 3 miles West of the pitch of the point, is the *Sunday Rock*. *Hole in the Wall*, the South part of the point, may be easily known by a remarkable gap in the trees at its extreme, which is conspicuous from the S.W.

In rounding the West part of Estevan Point, it would not be prudent to approach the shore within 2 miles.

From this point the coast takes a N.N.W. direction for 8 miles to Escalante Point at the entrance of Nootka Sound, being low, and foul ground exists off it for some distance.

NOOTKA SOUND.—This celebrated place was, until 1789, supposed to be on the continent of America, but the discovery of its insular character deprived it of the great importance previously attached to it.

It was named by Captain Cook, who came hither in his last and disastrous voyage, *King George's Sound*, but he afterwards found that it was called Nootka by the natives, and hence by that name it has ever since been

known. It is stated, however, that no word more nearly resembling Nootka than *Yukuatl*, or *Yuquot*, the name applied to Friendly Cove, has since been found.

It communicates with the Pacific by two openings, the southern one of which is probably the Port San Lorenzo, in which the Spanish navigator, Ensign Juan Perez, was, with his ship, the *Santiago*, August 10th, 1774 (St. Lawrence's day). He had been despatched by the Mexican viceroy to survey and take possession of these lands.*

Cook had heard that a Spanish expedition had been hither, and the foregoing fact was confirmed by the former purchasing from the natives two silver table-spoons apparently of Spanish make, one of which was worn as an ornament, and had probably been stolen from the *Santiago*.

From the accounts contained in Cook's voyage of the furs procured here, several vessels were fitted out from the East Indies to take advantage of the enormous profits they afforded. The earliest of these appears to be that of James Hanna, an Englishman, under Portuguese colours, who reached Nootka in April, 1785. He repeated the voyage in 1786, but then he had to compete with others, Capts. Lowrie and Guise, in two small vessels from Bombay, and Capts. Meares and Tipping from Calcutta, all under the East India Company.†

It was in the prosecution of this trade that Capt. Meares stated that he had purchased a tract for the erection of a house and factory in Nootka Sound, which subsequently led to very serious results. The Spaniards had claimed, by right of a papal bull, dated 1493, the whole of these countries, and also by the subsequent right by discovery; but they had not erected any fort, or in any other way taken possession of it. In consequence of the orders, or the misunderstanding of them, from the Spanish government, the *Iphigenia* was taken possession of by Estevan Martinez, who had accompanied Perez in 1774, and who had been sent hither to assert and maintain this claim. The *Argonaut*, under Capt. Colnett, was subsequently seized, and the captain sent a prisoner to San Blas, he suffering from delirium or insanity in consequence. From this and other matters the respective governments warmly took up the cause, and the consequences were some warlike preparations,

* Of this voyage no account appeared until 1802, when a short notice of it was given in the Introduction to the Journal of the *Sutil* and *Mexicana*. A more perfect notice from some Spanish MSS. will be found in Greenbow's History of Oregon, &c., pages 114—116.

† The accounts of these fur trades between 1785 and 1789 will be found in the Narrative of the Voyage of the Ship *Queen Charlotte*, by her Captain, John Dixon, or rather by her Supercargo, Beresford; the Narrative of the Voyage of the Ship *King George*, by Capt. Nathaniel Portlock; and the Narrative, before quoted, of the Voyages of Capt. John Meares.

which cost England three millions sterling, but which were quieted by the *Nootka Convention* of October, 1790, by which the South Seas were opened to British enterprise. The preparation of these fleets, however, was not without some results. They did good service afterwards, as Lord Howe's victory was gained by them four years later.

Vancouver was subsequently sent to recover possession of these lands, but did not then succeed as he intended, the Spaniards having erected a fort here, and the possession still remained undecided. In 1818, Spain concluded a treaty with America, in which she ceded all her possessions South of lat. 42° N. to the former power, leaving the northern part as it had been. This convention was renewed in 1827, and the whole question was definitively settled by the Oregon treaty of 1846.

The first who more minutely examined this important inlet was our great circumnavigator, Cook.

Sir Edward Belcher visited and surveyed a part of it in 1839, and it was completely examined by Captain G. H. Richards, in H.M.S. *Plumper*, in 1862. The following is from the Vancouver Island Pilot by that officer.

Nootka Sound is a large sheet of water upwards of 6 miles in extent, containing several islands, and from its North side three long narrow arms penetrate the land for distances of 18, 7, and 14 miles respectively. Its entrance is between Maquinna and Escalante Points, W. by N. $\frac{1}{2}$ N. and E. by S. $\frac{1}{2}$ S. from each other and distant 4 miles; at the entrance the shores are low, and have several off-lying dangers, but within they become high, rugged and precipitous, and are everywhere free from danger.

The soundings at the entrance vary from 40 to 60 fathoms, deepening within the sound to upwards of 100 fathoms in many places; to the southward of the entrance, and extending 6 miles West of Estevan and Escalante Points, is a bank of 22 to 30 fathoms water, deepening gradually to the S.W. In the vicinity of the Bajo Reef, and to the westward of it, are from 20 to 27 fathoms; but at a distance of 7 miles South of Nootka Island 40 to 60 fathoms will be found. In fine weather the natives will be met with in canoes, in considerable numbers, on these banks, fishing for halibut, which are very plentiful along this coast.

There are four anchorages in the sound, two of which, Friendly Cove and Plumper Harbour on the East side of Nootka Island, are small, though easy of access to steamers; the former is one, and the latter 7 miles within the entrance, the others in the Tlupana Arm, though well sheltered, are more inconvenient, being 13 and 16 miles from the entrance.

From seaward the appearance of the land near the entrance of the sound offers to the navigator many striking features which in fine weather render it almost impossible to be mistaken. The low land of Estevan and Maquinna Points at the entrance, with the breakers off them, the Nootka Cone at the East point of Nootka Island, and if coming from the South or S.S.W.,

Conuma Peak, a remarkable steeple-shaped mountain, nearly 5,000 ft. high is a most conspicuous feature.

Tides.—It is high water, full and change, in Nootka Sound, at 12^h, and the rise and fall is about 12 feet. The tidal streams are everywhere inconsiderable.

ESCALANTE POINT, the East point of entrance of the sound, is low and rocky; some islets, and rocks generally above high water, extend off it in a westerly direction for upwards of a mile. From Escalante Point to Burdwood Point, at the narrowest part of entrance on the East side, the coast, which still keeps a N.N.W. direction for 3 miles, is bordered by several off-lying rocks.

MAQUINNA POINT, the West entrance point of the sound, is 13½ miles N.W. of Estevan Point, and 4 miles W. by N. ½ N. from Escalante Point; it is low and wooded, and at its extreme is a remarkable bare-topped conical rock about 60 or 70 feet high; some rocks extend 3 cables off it in an easterly direction, also along the coast from it to the eastward nearly as far as the entrance of Friendly Cove, and the shore ought not to be approached nearer than three-quarters of a mile till near the latter place.

Bajo Reef, 6 miles S.W. by W. ½ W. from Maquinna Point and 2½ miles off shore, is about 2 cables in extent, and only breaks in heavy weather. This reef is the only hidden danger outside the sound, and is dangerous to vessels entering it from the westward.

FRIENDLY COVE, at the East extreme of Nootka Island, just within the narrowest part of the entrance to the sound, and about 2½ miles N.E. of Maquinna Point, is about 2 cables in extent, and sheltered from the sea by a small rocky high-water island on its East side. The entrance to it is from the N.E., and a cable wide, and the anchorage within is in from 5 to 9 fathoms, of small extent, affording room only for one vessel of moderate size to lie moored in the middle, though several small ones would find shelter. The shores on both sides of the cove are rocky and about 60 feet high on the N. side, but at the head is a small space of clear cultivated flat land, around which in the summer the natives build an extensive village.

If desiring to anchor in this cove, round Observatory Islet, the East entrance point, close to, and if in a large vessel moor with anchors S.S.W. and N.N.E., letting go the first immediately on entering the cove. Sailing vessels, unless with a fair wind, would find some difficulty in entering; and if unable to shoot in, it would be preferable to warp or proceed further up the sound to Plumper Harbour.

When the Spaniards were in possession of this coast in 1792, Friendly cove was their principal establishment; and when Captain Vancouver visited it in that year, no less than eight vessels were in it, most of them small, and secured to the shore by hawsers. At the present date no vestige whatever of the settlement remains.

No fresh water in any quantity can be procured at Friendly Cove, or nearer than Marvina Bay; but fish and deer may generally be obtained in large quantities from the natives.

The West shore of the sound from Friendly Cove runs in a N.N.W. direction for about 6 miles to the entrance of the Kendrick Arm and Tah-sis Canal; it is rocky, and some islets run parallel to it. There are two small creeks, with entrances, too narrow for a vessel to enter. The northernmost of them, called by the Spaniards Boca del Infierno, lies abreast the North part of the above-mentioned islands, and $1\frac{1}{2}$ mile from Friendly Cove.

Marvina Bay, 4 miles N.N.W. from Friendly Cove, on the East side of Nootka Island, is of small extent, and open to the southward; it only affords anchorage to a coaster, but there is a large fresh water stream at the head and just South of it, convenient for watering.

Kendrick Arm, at the West end of Nootka Sound between Nootka and Narrow Islands, is about 5 miles long in a north-westerly direction, and half a mile wide, connected at the North part by a narrow boat pass to the Tah-sis Canal; on the West side, one mile from its South part, is Plumper Harbour, easy of access, and well sheltered. Northward of this harbour the shores of the arm on both sides are rocky, terminating in two narrow creeks at the head, useless for purposes of navigation.

PLUMPER HARBOUR, on the West side of Kendrick Arm, and 6 miles from Friendly Cove, is a small bay indenting the East side of Nootka Island about 3 cables in extent, and affording good anchorage in 12 fathoms. It is protected on the East side by two small wooded islets from 30 to 40 feet high; on the West side the shore is rather swampy, and there are several fresh water streams.

There is a clear passage into the harbour between the two islets, or to the northward of the North one, which may be rounded at a cable, and there is room for a vessel to lie at single anchor inside; it is the best anchorage in the sound, the only drawback being its distance from the entrance.

Tah-sis Canal, the entrance to which is at the N.W. part of Nootka Sound about 6 miles from Friendly Cove, is a long narrow arm of the sea, nearly straight, and 14 miles long in a N.W. by N. direction; the shores are mountainous, rocky, and steep-to, and there is no anchorage within it.

Bligh Island, lying in the centre of the sound, is the largest island within it, being about 4 miles long in a northerly direction, and 2 miles wide in the northern part; its shores are rocky, and indented by some creeks on the southern side. Its South extreme is a long narrow point, about 3 miles N.E. of the entrance of the sound, and off its South and West sides are a number of islands extending upwards of a mile from it, all steep-to on their outer edges, but among which no vessel should venture. The South part of

the island is rather low, but it rises in the North and West parts to 1000 and 1200 feet.

Resolution Cove, at the S.E. point of this island, just within the entrance of the Zuciarle Channel, is only deserving of notice as the spot where Captain Cook refitted his ships in April 1778*; it is only a slight bend in the coast, with a deep and rocky bottom, and inconvenient for an anchorage, being also open to the S.W.

Zuciarle Channel, between the East shore of Nootka Sound and Bligh Island, is about 5 miles long in a northerly direction, and upwards of half a mile wide in the narrowest part; its shores are high and clear of danger, the soundings within the channel varying from 80 to 100 fathoms.

Guaquina, or **Muchalat Arm**, extends 17 miles in an E.N.E. direction from the N.E. part of Nootka Sound, and varies in breadth from a quarter to upwards of a mile. It is bounded on both sides by mountains from 2,000 to 4,000 feet high, and presents similar features to the inlets before described along this coast, terminating in low land at the head.

On the North side of this arm, 14 miles within the entrance, is an extensive valley, through which flows a large stream, named the Gold River, indications of that metal having been there discovered.

Tlupana Arm, the entrance to which is in the North part of Nootka Sound, is about 7 miles long in a northerly direction, branching off at the head in two smaller arms extending to the N.W. and N.E. Its shores are high and rocky, and the soundings in it vary from 80 to upwards of 100 fathoms; there are two anchorages, one at *Deserted Creek* on the West side, and the other at *Head Bay*, the termination of the N.W. branch.

The mountains at the North part of this arm are the highest in the sound, many being from 4,000 to 5,000 feet above the sea. *Conuma Peak*, rising 7 miles north-east from the head, is 4,889 feet high, and of a steep shape.

DIRECTIONS.—Entering Nootka Sound from the southward, after rounding *Estevan Point*, steer about N.N.W. for the entrance, which will be easily made out by the rocks off *Escalante* and *Maquinna Points*. Keep about 2 miles off the eastern shore till past *Escalante Point*, when steer up mid-channel into the sound. If bound to *Friendly Cove*, haul over to the West side of entrance for *Yu-quot Point*, which may be approached to a cable, and rounding it sharply, anchor or moor, as most convenient, in *Friendly Cove* in from 5 to 9 fathoms.

* In the second volume of the account of his last voyage there are given very ample details of the people, their manners, appearance, disposition, and resources, which are familiar to most. He calculated, of course at a venture, the number of people occupying the two villages, the only inhabited parts of the sound, to be about 2,000.

If bound to Plumper Harbour, after passing Yu-quot Point, keep about half a mile from the N.E. side of Nootka Island, on a N.N.W. or N. by W. course for a distance of 5 miles to the entrance of the Kendrick Arm, when steer up the latter in mid-channel till abreast Plumper Harbour, which may be entered by passing between Bold and Pass islets on its East side, or going to the northward of the former; anchor in 11 to 12 fathoms near the centre of the harbour.

Should it be desired to anchor in any of the anchorages within the Tlu-pana Arm, if provided with the chart, no directions whatever, are necessary.

Entering Nootka Sound from the westward, on nearing Bajo Point, do not approach the South shore of Nootka Island within 4 miles, or shut in Bight Cone with Bajo Point N. by W. until Yu-quot Point comes open East of Maquinna Point N.E. $\frac{1}{2}$ E., which will clear the Bajo Reef; a vessel may then steer for the entrance of the sound, about N.E. by E., not approaching the shore between Maquinna and Yu-quot points nearer than a mile, until abreast the latter, which may be rounded close-to, when proceed up the Sound as before directed. If beating into Nootka Sound, when standing to the westward, keep Yu-quot Point open East of Maquinna Point N.E. $\frac{1}{2}$ E., this will keep a vessel well clear to the eastward of Bajo Reef.

Nootka Sound is the easiest place of access on the whole of the West coast of Vancouver Island, the entrance being nearly 2 miles wide in the narrowest part; and by attending to the above directions any sailing vessel may beat in or out of the sound.

NOOTKA ISLAND, which bounds the West side of Nootka Sound, is of considerable extent, being 15 miles long in a northerly and 20 miles in a westerly direction. Its South, or outer shore is low, rising gradually inland to summits 1,500 and 2,500 feet above the sea, and has a beautiful and fertile appearance; it is bordered by a sandy beach nearly the whole distance, and the sea breaks heavily along it.

Bajo Point, 6 miles West of Maquinna Point, is low and rocky. A ledge, named the *Inner Bajo Reef*, extends $1\frac{1}{2}$ mile off it in a southerly direction; and the Bajo Reef, described in page 351, lies $2\frac{3}{4}$ miles to the S.E. by S.

Westward of Bajo Point the coast takes a W.N.W. direction for 10 miles to Ferrer Point, and is slightly indented. A remarkable summit, *Bight Cone*, 540 feet high, rises 3 miles N.W. by N. from Bajo Point, and is about 1 mile inland.

NUCHATLITZ INLET, on the N.W. side of Nootka Island, about 18 miles W. by N. $\frac{1}{2}$ N. from the entrance of Nootka Sound, is 6 miles long in a northerly direction, and 3 miles wide at entrance, narrowing towards the head. Its shores are high and rocky, and much broken into creeks and small bays. Off the entrance and within are several dangers. *Ferrer Point*, the South

entrance point of the inlet, is low and rocky; just within the point to the eastward is a very remarkable conical summit 350 feet high, called the *North-west Cone*, which is of great use in making out this locality from the westward.

Danger Rock, lying in the South part of the entrance, upwards of a mile N.W. $\frac{1}{2}$ W. from Ferrer Point, is the worst danger in entering, as it is of very small extent, and only breaks in heavy weather; it is steep-to on all sides, there being 11 fathoms close to it. The best passage into the inlet is between this rock and Ferrer Point. *Nuchatlitz Reef*, in the centre of the entrance and a third of a mile North of the Danger Rock, generally breaks, and at its inner extremity is a small rock awash at high water; there is a clear deep passage between it and Danger Rock, but it ought not to be attempted by a stranger. *South Reef*, which lies just within the entrance on the South side, is 1 mile N.E. by N. from Ferrer Point and about 3 cables off shore; it is nearly 2 cables in extent, and covers at half flood.

Fitz Island, in the centre of the inlet, and 3 miles from the entrance, is of small extent, low, rugged, and covered with a few stunted pine trees, the tops of which are about 100 feet above the sea. At half a mile West of it is a small bare rock 20 feet high, and steep-to on the West side, but between the rock and Fitz Island foul ground exists. *Mary Basin*, the termination of this inlet, is of considerable extent, and completely land-locked by *Lord Island*, which lies across the inlet at the S.W. part of the basin; it has not been sufficiently examined to recommend its being used by a stranger.

Port Langford, on the North side of Nuchatlitz Inlet, 2 miles within the entrance, is about $1\frac{3}{4}$ mile long in a northerly direction, and varies in breadth from a quarter to one mile. The soundings in it vary from 5 to 8 fathoms, and it affords a secure and well sheltered anchorage at the distance of half a mile from the head. Within the entrance it is clear of danger.

Colwood Islet, at the S.W. extreme of the entrance, is small and bare, 20 feet above water.

Directions.—Entering Nuchatlitz Inlet from the southward, bring Ferrer Point on a N. by W. bearing, and steer to pass half a mile West of it; and when Mark Hill comes on with the North part of Fitz Island N.E. $\frac{1}{2}$ E., haul in for the entrance on that mark, which will lead in clear of Danger Rock. When Ferrer Point bears South, a vessel will be inside the rock, and may steer N. by E. $\frac{3}{4}$ E., or N.N.E. for the entrance to Port Langford; pass midway between Colwood Islet and Belmont Point, and proceed up the port in mid-channel, anchoring in 5 or 6 fathoms, at a distance of half a mile from the head.

Approaching the port from the westward, keep an offing of 4 or 5 miles, till Ferrer Point bears East, when steer for it on that bearing till the leading mark for the channel comes on, Mark Hill in line with the North part of Fitz Island N.E. $\frac{1}{2}$ E., when proceed as before directed.

No vessel of any size should attempt to beat into this inlet, as there is generally a heavy sea at the entrance, and no stranger should attempt to enter unless the leading mark is well made out.

ESPERANZA INLET, the entrance of which lies between the N.W. side of Nootka Island and the main of Vancouver, and is 122 miles W. by N. $\frac{1}{2}$ N. from Cape Flattery lighthouse, is about 16 miles long in a winding north-easterly direction, and its average breadth is about 1 mile, narrowing at the head, which is connected by a narrow pass, Tah-sis Narrows, to the Tah-sis Canal in Nootka Sound.

The entrance, though wide, contains several dangers; but within the shores are nearly everywhere steep-to, rising on both sides to mountains of considerable height. The southern shore is indented by three bays of moderate extent, which, however, afford no anchorage; and from the northern one three arms of considerable length penetrate the Vancouver shore for several miles in a N.N.W. direction. In the western arm, named Port Eliza, is the only anchorage within the inlet.

The soundings in the entrance vary from 12 to 20 fathoms, deepening within to upwards of 100 fathoms in many parts.

Middle Channel, the widest and best into Esperanza Inlet, is 3 miles long in a northerly direction, and upwards of a mile wide in the narrowest part. Its entrance lies 3 miles W.N.W. from Ferrer Point. The West side is clear, except at the South part, where lies the Middle Reef, a part of which is always above water.

Blind Reef, which lies at the S.E. extreme of the channel, and 3 miles N.W. $\frac{1}{2}$ W. from Ferrer Point, is about 2 cables in extent, and only breaks in bad weather. **Needle Rock**, which is of small extent, lies two-thirds of a mile North of the Middle Reef, and has from 14 to 15 fathoms at a distance of 2 cables West of it. **Middle Reef**, at the S.W. entrance point of Middle Channel, and separating it from the North Channel, generally breaks, and at its South extreme is a small rock 4 feet above high water. Its South part lies 4 miles N.W. by W. $\frac{1}{4}$ W. from Ferrer Point.

North Channel leads into Esperanza Inlet West of Middle Reef, between it and the dangers off the S.E. point of Catala Island. It is about a third of a mile wide, and upwards of 2 miles long, merging at the North part into Middle Channel. The soundings in it vary from 17 to 22 fathoms, and the dangers on its West side are all above water.

Catala Island, $5\frac{1}{2}$ miles N.W. $\frac{1}{2}$ W. from Ferrer Point, on the West side of the entrance to Esperanza Inlet, is about $1\frac{1}{2}$ mile long, in a westerly direction, and a mile wide in its broadest part. This island is wooded, and from 150 to 200 feet high; its shores are rocky, and several dangers exist at a considerable distance off it on all sides. Its North side is separated from the Vancouver shore by a passage half a mile wide, named Rolling

Roadstead, and a vessel may find a tolerably secure anchorage there in from 4 to 6 fathoms, though generally a swell prevails in it.

Rolling Roadstead.—Entrance Reef, about 3 cables North of the East point of Catala Island, at the eastern part of Rolling Roadstead, is of small extent, and covers at half flood. At half a mile North of it, and about 2 cables off the opposite shore, lies the *Arnold Rock*, which is awash at high water. Half a mile inshore, and overlooking the N.E. part of Rolling Roadstead, is *Leading Mountain*, 1,104 feet above the sea. It is of conical shape, and conspicuous from the entrance of the Middle Channel.

Double Island lies half a mile off the West shore at the inner and narrowest part of the entrance to Esperanza Inlet, and $3\frac{1}{2}$ miles within the outer part of the North and Middle Channels. It is of small extent, and wooded. *Flower Islet*, on the opposite shore, 1 mile E.S.E. of Double Island, and half a mile off the N.W. point of Nootka Island, is small and bare, and the northernmost of the islets off Nootka Island between the entrances of Nuchatlitz and Esperanza Islets. At 2 cables S.W. of it is a small rock 2 ft. above high water.

Hecate Channel, near the head of the inlet, is 5 miles long in a winding direction to the eastward, and its average breadth is about 6 cables. The western end is 8 miles from the entrance of Esperanza Inlet; and the eastern one, named *Tah-sis Narrows*, is about a cable wide, with 28 fathoms, and connects this channel with the Tah-sis Canal in Nootka Sound. The shores are high and rocky, and may be approached close-to.

Port Eliza, the entrance to which is on the North side of the inlet, 1 mile N.E. of Double Island, is a narrow arm $5\frac{1}{2}$ miles long in a N.W. direction, and its breadth varies from 2 to 4 cables. There is good anchorage in from 14 to 15 fathoms at the distance of half a mile from the head. The head terminates in a small patch of low swampy land.

Harbour Island, in the centre of the entrance, is of moderate height. The passage into Port Eliza on its East side, through *Birthday Channel*, is 2 cables wide in the narrowest part, and clear of danger. Between Harbour Island and the West shore lies *Falee Channel*, which has irregular soundings, and in its South part are two rocks which cover at half flood. *Channel Reef*, half a mile N.N.W. of Harbour Island, in the middle of Port Eliza, is about a cable in extent, and covers at three-quarters flood.

Queen's Cove, on the East side of the port, about $1\frac{1}{2}$ mile from the entrance, is 4 cables long and 2 cables wide, with from 6 to 7 fathoms water, and affords room for a large vessel to lie moored in the centre. Its shores are high and rocky. The cove is completely land-locked, and only half a cable wide at the entrance.

Espinoza Arm, the entrance to which is 2 miles N.E. of Port Eliza, is 8 miles long in a N.N.W. direction, and its average breadth is half a mile. The soundings within it are deep, and it affords no anchorage; at the

entrance on the West side are some small islets, and a rock which uncovers.

Zeballos Arm, the entrance to which lies 10 miles within the inlet, at the West end of Heento Channel, is about 6 miles long in a winding direction to the N.W., and about two-thirds of a mile wide. Similar to the Espinoza Arm, it offers no anchorage whatever, and is of no use to the navigator.

Directions.—A stranger entering Esperanza Inlet from the southward, through the Middle Channel, and intending to anchor in Port Eliza, should pass Ferrer Point at a distance of about 3 miles, and keep on a northerly course till nearing the entrance of Middle Channel, when steer to bring Leading Hill in line with Black Rock N. by W., which will lead through the fairway, and clear of the dangers on both sides of the channel. When the South point of Catala Island bears W.N.W., the vessel will be inside the dangers at entrance, and should keep about N.N.E. for the entrance of Port Eliza, passing from 2 to 3 cables East of Double Island. In entering the port steer through Birthday Channel, passing a cable East of Harbour Island; when past the East point of the latter, keep about N.W. by N. for the entrance of Queen's Cove, or further over to the eastern shore, to avoid the Channel Reef. In entering the cove, pass to the West of the island at its entrance, and moor immediately the vessel is inside, anchors N.W. and S.E.

No sailing vessel of any size should attempt to enter Port Eliza unless with a steady fair wind.

If bound to Rolling Roadstead, enter the Middle Channel as before directed, but instead of steering for the entrance of Port Eliza, keep on a N. by W. or N. $\frac{1}{2}$ W. course (passing about a quarter of a mile East of Black Rock), until the outer extreme of the islets off the N.W. part of Catala Island come open North of the low grassy point on its North side bearing W. by S., when haul for the roadstead on that mark, which will lead midway between Arnold and Entrance Reefs. Anchor in 6 fathoms, with the extremes of Catala Island bearing W.S.W. and S.E. by S.

Entering Esperanza Inlet from the westward, keep an offing of $2\frac{1}{2}$ or 3 miles from Catala Island (if Kyuquot Hill be made out, by keeping it open West of Tat-chu Point N.W. by W., a vessel will be well clear of any dangers off Catala Island), till Double Island comes in line with Black Rock N. by E. $\frac{1}{4}$ E., and entering the inlet through the North Channel with this mark on, which lead in clear of danger.

Generally a heavy swell prevails off the entrance of the Nuchatlitz and Esperanza Inlets, and no sailing vessel should attempt to enter or leave either of them, unless with a steady fair or leading wind.

The **COAST**, westward of Catala Island to Tat-chu Point, runs in a westerly direction for upwards of 3 miles, is indented by two small sandy bays, and bordered by a number of rocks, some of which extend nearly 2 miles off shore. *Tat-chu Point* is clifly; some rocks lie a short distance to

the southward of it, and there is a native village of considerable size at half a mile East of it. *Eliza Dome*, a remarkable summit, 2,812 feet above the sea, rises $1\frac{1}{2}$ mile within the point, and is very conspicuous from seaward.

From Tat-chu Point the coast turns to the W.N.W. for 7 miles to the entrance of Kyuquot Sound, and is indented by several small bays, in some parts of which boats may find shelter.

BARRIER ISLANDS.—At 2 miles westward of Tat-chu Point is the commencement of a chain of small islands and reefs bordering the coast of Vancouver Island for nearly 20 miles in a westerly direction to the entrance of Ou-ou-Kinsh Inlet. They extend in some parts as far as 5 miles off shore, and through them are two known navigable channels, the Kyuquot and Halibut, leading to anchorages; the former channel leads into Kyuquot Sound, and the latter into Clan-ninick Harbour, but as a rule no stranger should venture into them, or among these islands. *Highest Island*, one of the Barrier group, lying 2 miles South of Union Island, is a remarkable bare rock 98 feet high, and useful in identifying the Kyuquot Channel.

KYUQUOT SOUND, the eastern entrance of which is 12 miles from Esperanza Inlet, is a large broken sheet of water penetrating from the coast to a distance of 14 or 15 miles inland in two large arms, and several smaller ones. There is a large island at the entrance, and on either side of it is a channel into the sound, the eastern one only being fit for large vessels. There are also several islands within, mostly small; its shores are generally rocky, and very much broken, rising within to high mountains, 2,000 and 4,000 feet above the sea.

The soundings outside vary from 20 to 40 fathoms, generally sandy bottom. At the entrance are from 40 to 60 fathoms, but within the sound the depths increase in many places to upwards of 100 fathoms. There are three anchorages, Narrowgut and Easy Creeks, and Fair Harbour, the two latter being of considerable size, but at a distance of 13 and 10 miles from the entrance; the former is very small, but only 5 miles within the sound.

Kyuquot Channel, leads into the sound through the Barrier Islands, and to the eastward of Union Island. It is nearly straight, about 5 miles long in a N.N.E. direction, and its breadth is little less than a mile. The soundings within it vary from 30 to upwards of 40 fathoms, increasing gradually to the inner part, and a mid-channel course through is clear of danger.

East Entrance Reef, one of the Barrier group lying at the south-east extreme of the channel, $6\frac{1}{2}$ miles W. by N. $\frac{1}{4}$ N. from Tat-chu Point, is about 2 cables in extent and 4 feet above high water. No vessel should stand inside it.

Rugged Point, the S.E. entrance point of Kyuquot Sound, is upwards of 2 miles North of East Entrance Reef on the East side of the channel. It is rugged and rocky, but steep-to on the West side. Between it and

East Entrance Reef are a number of rocks, among which no vessel should venture.

West Rocks, at the S.W. extreme of Kyuquot Channel, and 2 miles N.W. $\frac{1}{2}$ W. from East Entrance Reef, are two in number, and 50 feet above high water. Some rocks, which cover at a quarter flood, extend half a mile S.E. of them, with 20 fathoms close to their outer edge.

White Cliff Head, the S.E. extreme of Union Island, is 1 mile N.N.E. of the West Rocks, and abreast Rugged Point; it is about 70 feet high, faced to the southward by a remarkable white cliff. There are 35 fathoms within 1 cable of it. Half a mile within the head is *Kyuquot Hill*, a remarkable summit 740 feet high, bare of trees on its East side, and very conspicuous from seaward.

Chat-Channel Point, the north-west extreme of Kyuquot Channel, and the East point of Union Island, is a low rocky point with a remarkable nob just inside it. A rock, which uncovers at a quarter flood, lies 2 cables East of it.

Leading Island, just northward of Kyuquot Channel, and nearly $3\frac{1}{2}$ miles from White Cliff Head, is about $1\frac{1}{4}$ mile long in an East and West direction, and half a mile wide. Its shores are steep-to, and the island rises near the centre to a summit 400 feet high, which kept midway between White Cliff Head and Rugged Point, N. by E. $\frac{1}{2}$ E., leads into the sound through the fairway of Kyuquot Channel.

UNION ISLAND, in the entrance of the sound, and protecting it from the ocean, is of square shape, and upwards of 3 miles in extent. Its surface is undulating, rising in the N.W. part to nearly 1,500 feet.

Blind Entrance leads into the sound westward of Union Island, between it and the Vancouver shore, forming a narrow tortuous channel with some rocks in the outer part, and which should not be entered by a stranger; coasters, however, often enter the sound by this channel, but no directions can be given for navigating it.

Narrowgut Creek, in the S.E. part of the sound, about $1\frac{1}{4}$ mile from the termination of the Kyuquot Channel, is very narrow, and 1 mile long in a north-easterly direction. The soundings in it vary from 16 to 8 fathoms, and there is only just room for a vessel to moor, as its breadth is less than a cable. The creek is easy of access to a steamer. *Shingle Point*, at the entrance of the creek on the North side, was the observation spot used in the sound, and is in lat. $49^{\circ} 59' 55.5''$ N., long. $127^{\circ} 9' 30''$ W.; the variation in 1862 was $23^{\circ} 40'$ East.

Deep Inlet, at $1\frac{1}{4}$ mile N.W. of Narrowgut Creek, is about 3 miles long in a north-easterly direction, but affords no anchorage. On its North side, at the entrance, is a remarkable high precipice.

Ho-hoe Island, nearly in the centre of the sound, and half a mile North of Union Island, is about 2 miles long in a north-easterly direction. On its

N.E. side is *Dixie Cove*, where a small craft may anchor in 6 fathoms completely land-locked. *Pinnacle Channel*, between Ho-hoae Island and the East shore of the sound, is about 3 miles long in a northerly direction, and half a mile wide, clear of danger.

Tah-sish Arm, in the North part of the sound, has its entrance 5 miles from the termination of the Kyuquot Channel. It is 6 miles long in a winding direction to the northward, and its shores, except at the head, are high, rugged, and generally steep-to. The head terminates in low swampy land. There is one anchorage 1 mile within the entrance, on the East side, called Fair Harbour.

Fair Harbour is of an oblong shape, $2\frac{1}{2}$ miles in length in a N.E. direction, from 3 to 4 cables wide, and affords anchorage near either end in from 13 to 11 fathoms; its shores generally are high and steep. From the East end a bank dries off a cable, and the western one is a low narrow neck about a cable wide at low water, and separates the harbour from Pinnacle Channel. The entrance to it, which lies on the North side near the middle, is nearly a mile long, and from 1 to 2 cables wide, with some small islets on its North side, the soundings in it being very irregular, varying from 5 to 20 fathoms. In entering keep the South shore close on board. This harbour can be entered by steamers or sailing vessels with a fair wind.

Moke-tas Island, in the North part of the sound, between the entrance to the Tah-sish and Kok-shittle Arms, is about 2 miles long, and 1 mile wide, rocky, and about 400 feet high; its East and West sides are steep-to. At 1 cable off its North shore, near the centre, is a rock under water, and to the S.E. of it lie the Channel Rocks, a small patch about 3 feet above high water; they are, however, steep-to.

Kok-shittle Arm, the entrance of which is in the N.W. part of the sound, about 6 miles from Kyuquot Channel, is upwards of 8 miles long in a north-westerly direction, and about a mile wide at the entrance, narrowing gradually towards the head; its shores are rocky, and of a broken outline, with several small islets off them. The soundings vary from 20 to 80 fathoms, shoaling gradually towards the head. There are no dangers, and a very good anchorage, the best in the sound, on its West side, at a distance of 4 miles from the entrance. The head of the arm terminates in low swampy land, through which flows a small stream, and a bank extends off about 2 cables. *Easy Creek*, on the West side of Kok-shittle Arm, and 13 miles from the entrance of the sound, is about 2 miles long in an E.S.E. direction, turning sharply round from its entrance to the southward, and running parallel to the inlet, being separated from it by a narrow rocky peninsula. There is good anchorage from half a mile within the entrance to the head. It ought to be entered in mid-channel.

Chamis Bay, formed in the West side of Kyuquot Sound, about 1 mile

VANCOUVER ISLAND.

from the North part of Blind Entrance, is nearly half a mile in extent, but affords no anchorage, the water being too deep.

Directions.—No sailing vessel should attempt to enter Kynuquot Sound, unless with a steady fair, or leading wind, as generally a heavy swell prevails outside, which in a light wind would render her position critical; and no stranger should attempt to venture in, unless provided with the chart, the weather clear, and the leading mark for the channel well made out.

Entering the sound by the Kynuquot Channel, which is the only one a stranger ought to use, keep a good offing, till the entrance of the channel is made out (White Cliff Head and Kynuquot Hill at the S.E. point of Union Island, which have been before described, are very conspicuous, and will identify the channel), when bring the summit of Leading Island midway between Chat-channel and Rugged Points N. by E. $\frac{3}{4}$ E., and steer up the channel with that mark on. In nearing Chat-channel Point, give it a berth of at least 4 cables to avoid the rock which lies off it.

CLAN-NINICK HARBOUR, on the Vancouver shore, 3 miles to the westward of Kynuquot Sound, is about 1 mile long in a westerly direction, half a mile wide, and affords good anchorage in from 7 to 10 fathoms, at the distance of half a mile from the head, from which a sand-bank extends 2 cables.

The harbour is protected by some islands of the Barrier group from the ocean, and there is only one channel, the Halibut, into it that is open, which, though clear of danger, ought not, except under unavoidable circumstances, to be attempted by a stranger.

HALIBUT CHANNEL, which runs through the Barrier group from the ocean to the entrance of Clan-ninick Harbour, lies westward of Table and Village Islands, and East of Look-out Island. It is about 3 miles long in a northerly direction, and half a mile wide in the narrowest part. The soundings in it vary from 16 to 6 fathoms, being somewhat irregular; but a mid-channel course through, except in the northern part, is clear of danger.

Table Island, on the East side of the channel, is the largest of the Barrier group, being nearly half a mile in extent, and about 150 feet high. *Trap Bluff*, on the West side of the island, is conspicuous.

Half a mile East of Table Island is an anchorage with from 4 to 6 fathoms, tolerably sheltered by some islands from seaward, and much used by coasters in summer months. The entrance to it is rather intricate, and no stranger, or any except a small vessel, should attempt to enter.

Village Island, on the East side of Halibut Channel, just North of Table Island, is small, and about 150 feet high; on its East side is a large native village, much frequented in summer; off it a bank dries nearly 3 cables. To the eastward of this island is a small cove among the Barrier Islands called *Barter Cove*, with from 1 to 3 fathoms; it is well sheltered in all

weather, and much frequented by coasters when fur trading. The entrance to it is very narrow, and almost choked up with rocks.

Two cables North of Village Island is a rock awash at high water springs, but there are from 5 to 6 fathoms at a distance of a cable off the West side.

Look-out Island, at the South entrance point of Halibut Channel, lies nearly 1 mile S.W. of Table Island; it is small, covered with a few trees, and about 150 feet high. *Granite Island*, which forms the South side of Clan-ninick Harbour, is about half a mile in extent, and joined by a sandy beach at low water to the Vancouver shore; 3 cables East of its East point is a very dangerous rock, *Chief Rock*, which lies at the termination of the Halibut Channel, and only uncovers at low water springs.

As before noticed, no stranger should attempt to enter this harbour without a pilot, unless from absolute necessity, and if in a sailing vessel, only with a steady fair wind.

OU-OU-KINSH INLET, 10 miles W.N.W. from Kyuquot Sound, is 7 miles long in a north-easterly direction, and $1\frac{1}{2}$ mile wide at the entrance, narrowing gradually towards the head; the shores within are high, rising from 2,000 to upwards of 3,000 feet.

The soundings in the inlet vary from 40 to 60 fathoms, and there is only one indifferent anchorage, Battle Bay, just within the entrance, on the West side. The entrance lies West of the Barrier Islands, is a mile wide in the narrowest part, and the soundings in it varying from 14 to 48 fathoms.

Clara Islet, at the S.E. extreme of the entrance, is small, bare, and 20 feet above high water; no vessel ought to go eastward of, or approach it within half a mile. This islet is the westernmost of the Barrier Islands, and lies $21\frac{1}{4}$ miles W. by N. from Tat-chu Point, where they may be almost said to commence.

Bunsby Islands, on the East side of entrance, close in shore, are about 2 miles in extent, and from 200 to 300 feet high. The passages between them and the shore are choked up with rocks, but their West side is steep-to. Pinnacle Point and Green Head at their S.W. extreme are remarkable. To the northward of these islands is *Malksape Inlet*, 4 miles long in a north-easterly direction, but the entrance is intricate, and there is no anchorage within it.

Cuttle Group, lying at the S.W. entrance point of Ou-ou-Kinsh Inlet, and $1\frac{1}{2}$ mile N.W. of Clara Islet, is comprised of a number of small islets and rocks, some of the former being wooded. Nearly 1 mile S.W. of them is a rock which breaks in fine weather. On the Vancouver shore, just N.W. of them, is a remarkable summit, the *Lone Cone*, 356 feet high, and useful in identifying the entrance.

Sullivan Reefs are a very dangerous patch of rocks lying nearly 3 miles outside the entrance of Ou-ou-Kinsh Inlet, $2\frac{1}{2}$ miles W. by S. from Clara

islet, and nearly 4 miles S.S.E. of Hat Island in Nasparti Inlet. They are about half a mile in extent East and West, and only break occasionally; there are from 10 to 11 fathoms close around them.

Battle Bay, which is just within the entrance of Ou-ou-Kinsh Inlet on the West side, is upwards of a mile wide, and half a mile deep, with several islets and rocks inside it near the middle. Near the North part there is anchorage in from 6 to 9 fathoms, which may be used in fine weather.

NASPARTI INLET, $3\frac{1}{4}$ miles West of Ou-ou-Kinsh Inlet, on the East side of a large peninsula of which Cape Cook is the S.W. extreme, and in the head of an open bight or bay, is about 4 miles long in a northerly direction, and about half a mile wide at the entrance, decreasing in some places to less than 3 cables. Its shores are high and rocky, indented by some slight bays. There is a fresh-water stream at the head, from which a bank extends about 3 cables. The soundings vary from 13 to 30 fathoms, and there is a secure though rather limited anchorage, in from 13 to 16 fathoms, at the distance of half a mile from the head. Outside the entrance are several dangers, but none within, and the projecting points may be approached at a cable's distance.

The Sullivan Reefs, just described, lie $3\frac{1}{4}$ miles S.S.E. of the entrance, and appear to be pretty steep-to on the West side.

Haystacks, off the East side of the entrance, and $1\frac{1}{2}$ mile North of the Sullivan Reefs, are two bare sharp-topped cliffy rocks 65 ft. high, and about 3 cables apart. There is a clear deep passage between them and the Sullivan Reefs. **East Rock**, 3 cables off the East entrance point, is of small extent, has 17 fathoms at a cable's distance to the westward of it, and covers at half flood. **Yule Islet**, about 40 feet high, lies midway between the Haystacks and East Rock. **Mile Rock Breaker** lies $1\frac{1}{4}$ mile off the West shore of entrance to the inlet, and 2 miles W. by N. $\frac{1}{4}$ N. from Sullivan Reefs. It is very dangerous to vessels entering the inlet, as it is of small extent, and only breaks in heavy weather. No vessel should stand to the westward of this danger.

Mile Rock, nearly a mile North of the above-mentioned danger, is a small bare rock, 12 feet above high water. **Hat Island**, lying in the centre of the inlet just within the entrance, is small, and has a few stunted trees on the summit; from the southward it is very conspicuous, and appears somewhat like a hat. It is steep-to on the East side, but nearly midway between it and the West shore is a shoal patch of $2\frac{1}{4}$ fathoms, marked by kelp. In entering the inlet pass eastward of the island.

Nasparti Inlet should not be used by a stranger unless unavoidably necessary, as in thick or cloudy weather it might be difficult to make out the leading marks, and no one should attempt to enter unless they are well made out, especially as the outlying dangers only break in heavy weather, and are seldom seen. A sailing vessel ought, in passing the entrance of this and

Ou-ou-Kinsh Inlet, to keep Solander Island open South of the land East of Cape Cook bearing West.

BROOKS PENINSULA.—To the westward of Nasparti Inlet is a peninsula of an oblong shape, 9 miles long, and about 5 miles wide, projecting into the ocean in a S.S.W. direction. Its shores are generally very rocky, and rise almost abruptly from the sea to upwards of 2,000 feet. There are several off-lying dangers around it, some of which extend upwards of a mile off shore.

CAPE COOK, or Woody Point, the S.W. extreme of this peninsula, and the most projecting point of the outer coast of Vancouver Island, 163 miles W. by N. $\frac{1}{2}$ N. from Cape Flattery Lighthouse, and 69 miles W. by N. $\frac{1}{4}$ N. from Estevan Point. The cape rises abruptly from the sea to a summit 1,200 feet high. Nearly 1 mile West of it lies Solander Island, which is bare, 580 feet high, and has two sharp summits. Between it and the cape the passage is choked up with rocks, and no vessel or even boat should go inside the island.

At a distance of 2 miles off Cape Cook and the South side of the peninsula, the soundings are from 20 to 90 fathoms, and, as a rule, no vessel should approach nearer.

BROOKS BAY, on the West side of the peninsula, is a large open bay, about 12 miles wide and 6 miles deep. There are several dangers within it, and two inlets, Klaskish and Klaskino, which afford anchorage, but are very difficult of access, and no vessel should attempt to enter either unless embayed and unable to get out of Brooks Bay.

Clerke Reefs lie in the S.E. part of the bay, and 5 miles North of Cape Cook; their outer part is 2 miles off the East shore of the bay. They cover an extent of upwards of 2 miles; some are under water, others uncover, and no vessel should venture among them.

Klaskish Inlet, at the head of Brooks Bay, on the West side of the peninsula, and 10 miles N.N.E. of Cape Cook, is about 2 miles long in a north-easterly direction, and 1 mile wide at entrance. At its head is a long narrow basin, the entrance of which is too contracted for a vessel to enter. There is an anchorage just within the entrance of the inlet on the South side, to the eastward of Shelter Island, but it is difficult of access to a sailing vessel.

Surge Islets, on the South side of the entrance, about a mile off shore, are small, rocky, and about 40 feet high; foul ground exists among them. *Shelter Island,* just within the entrance of the inlet on its South side, is about half a mile in extent, 300 ft. high, with a summit at each end covered with a few stunted trees. The anchorage on its East side is about a third of a mile in extent, with from 10 to 13 fathoms, well sheltered, but the bottom is irregular. The entrance to it, round the N.E. side of the island, is less than a cable wide in the narrowest part.

Between Shelter Island and the North entrance point of the inlet is a heavy confused sea, which would be dangerous for sailing vessels, as the wind generally fails there.

Entering the anchorage on the East side of Shelter Island, do not bring Cape Cook to the southward of S.S.E. $\frac{1}{2}$ E., till Leading Cone, a remarkable summit at the head of the inlet about 500 ft. high, comes in line with Small Islet on the North side of entrance bearing N.E. by E. $\frac{1}{2}$ E., which mark will lead into the inlet well North of the Clarke Reefs and Surge Islets. When abreast the latter, haul a little to the eastward, so as to enter midway between Small Islet and Shelter Island; pass within a cable East of the bare islet off the latter's N.E. point, and anchor in 13 fathoms, with the extremes of Shelter Island bearing N.W. by W. $\frac{1}{2}$ W. and S.W. $\frac{1}{2}$ W.

The entrance of this anchorage is intricate and narrow; and unless unavoidably necessary, no vessel larger than a coaster should attempt it, as a furious sea rages all around the outer parts.

Ship Rock, lying nearly 8 miles N. by W. of Cape Cook, 2 miles off the shore in the centre of Brooks Bay, and midway between Klaskish and Klaskino Inlets, is of small extent, and has from 17 to 20 fathoms close on its South and East sides. The sea generally breaks very heavily over it.

KLASKINO INLET, the entrance to which is in the North part of Brooks Bay, and 10 miles N. $\frac{3}{4}$ W. from Cape Cook, is nearly 6 miles long in a winding direction to the E.N.E. There are numerous rocks off the entrance, but a safe though intricate passage through them; and there is also a good anchorage on the South side, 2 miles within the inlet. The soundings vary from 12 to 40 fathoms, increasing gradually inside, which becomes narrow, with high and rocky shores, terminating in low land at the head.

Nob Point, the South entrance point of the inlet, is rocky, and covered with a few stunted trees; some rocks extend 3 or 4 cables off it, and close to its outer part is a rocky nob about 100 feet high. **Anchorage Island**, in the middle of the inlet, about 2 miles within the entrance, is of small extent, and rocky. The anchorage or harbour is between the East side of this island and the shore; it is well sheltered. Inside Anchorage Island some rocks extend nearly across the inlet, rendering it almost impossible for a vessel to go beyond them.

Red Stripe Mountain, rising on the North side of entrance, abreast Anchorage Island, is a remarkable conical-shaped summit 2,200 feet high, with a valley on either side of it; on its South part, facing seaward, is a conspicuous red clifly stripe or landslip, easily distinguished from the outside; the lower part of it in line with Twenty-foot Rock, bearing N.N.E. $\frac{3}{4}$ E., leads into the entrance South of Channel Reefs, and well N.W. of Ship Rock.

Twenty-foot Rock, 4 cables W.N.W. of Nob Point, is bare, and 20 ft. above

high water. It is conspicuous from the outside. The only channel into the inlet is to the westward of the rock, between it and the Channel Reefs.

Channel Reefs, the S.E. part of which is $3\frac{1}{2}$ cables W. by S. of Twenty-foot Rock, are an irregular cluster of rocks, mostly under water, extending in a westerly direction to the N.W. shore of Brooks Bay. There is deep water between them in many places, but the only safe passage into Klaskino Inlet is upwards of 3 cables wide, with deep water between their S.E. part and Twenty-foot Rock.

If obliged to enter Klaskino Inlet, when outside Ship Rock, bring Twenty-foot Rock in line with the lower part of red stripe on Red Stripe mountain, bearing N.N.E. $\frac{3}{4}$ E., and run boldly for the entrance with that mark on, which will lead $2\frac{1}{2}$ cables South of the Channel Reefs; keep on this course till within 2 cables of Twenty-foot Rock, when haul a little to the northward, and pass it on its North side at a cable's distance, after which steer about N.E. by E. $\frac{1}{2}$ E. for the centre or South part of Anchorage Island, passing a cable or so North of the rocks off the South side of the inlet. When abreast the S.W. point of the island, haul quickly to the eastward, round the rocks off its S.E. point within half a cable, and anchor in from 9 to 10 fathoms, midway between the East side of the island and the main, with the extremes of the former bearing N.W. and S.W. by W. A large vessel should moor.

The entrance to Klaskino anchorage is even more intricate than that of Klaskish, and should not be attempted by a stranger unless absolutely necessary for safety. Fresh water may be procured in both these anchorages.

Three miles from Klaskino, in the N.W. part of Brooks Bay, is a large rivulet where boats may enter and find shelter in bad weather.

LAWN POINT, the N.W. extreme of Brooks Bay, lies 12 miles N.W. by N. from Cape Cook; it is low, and some rocks extend more than half a mile in an easterly direction from it, inside of which a boat may find shelter. The sea breaks violently about this point, and everywhere along the shores of Brooks Bay.

The land in the vicinity of Lawn Point appears very fertile, and lightly timbered; it rises gradually from the sea to a height of 1,900 feet.

QUATSINO SOUND, the north-westernmost of the deep inlets on the outer coast of Vancouver Island, is an extensive arm of the sea, which penetrates the island in a north-easterly direction for upwards of 25 miles. The breadth at the entrance is nearly 6 miles, narrowing to less than a mile at a distance of 5 miles within; the sound then runs in a north-easterly direction, nearly straight for 13 miles, when it branches off in two arms, one extending to the S.E. for 12 miles, and terminating in low land. The other arm lies to the northward of, and is connected with, the sound by a straight narrow pass about 2 miles long. Its length is 22 miles in an East and West direc-

tion, and the eastern extreme, Rupert Arm, is only 6 miles distant from Hardy Bay on the N.E. side of Vancouver Island. The western part terminates within 12 miles of San Josef Bay on the outer coast. Just within the entrance of the sound on the North side is Forward Inlet, a much smaller arm, about 6 miles long in a northerly direction, in which are the best anchorages of the sound.

The shores of Quatsino Sound are generally high, and near the entrance very much broken. There are several islands within and along its shores, but they are mostly small.

From the outside the entrance of Quatsino Sound presents several remarkable features, which render it easy to be made out. The entrance is nearly 6 miles wide, and along its South side are several rocks and small islands; on both sides of, and within the sound the land is high, and some of the summits are very conspicuous, among others the Flat-top and Entrance mountains to the northward of the entrance, and the Nose Peak and Gap mountains inside, the Nose Peak being easily distinguished from its sharp rocky summit.

The soundings in the entrance, and from 3 to 5 miles outside, vary from 30 to 70 fathoms, but within they deepen in many places to upwards of 100 fathoms. There are several dangers along the South shore at the entrance. In the fairway are two very dangerous rocks, which only break in heavy weather, and it requires great caution on the part of the navigator to avoid them, when entering or leaving the sound.

It is high water, full and change, in Quatsino Sound at 11^h, the rise and fall of tide being about 11 feet.

Reef Point, the S.E. entrance point of the sound, is 14 miles N.W. by N. from Cape Cook, and $1\frac{1}{2}$ mile from Lawn Point, the N.W. extreme of Brooks Bay. It is low and rocky, but rises gradually to a well-defined summit, 1,901 feet above the sea. The coast between it and Lawn Point forms a slight bay filled with a number of rocks extending a considerable distance off shore. *Boat River*, which runs into a small bight on the South shore of the sound, $5\frac{1}{2}$ miles within Reef Point, is merely a small stream which a boat can enter.

Bold Bluff, 7 miles North of Reef Point, on the South side of the sound, is, as its name implies, a bold, rocky salient bluff, rising suddenly to upwards of 200 feet, when it slopes gradually to a summit, upwards of 1,600 feet high; it may be safely approached to a cable. At this spot the sound contracts in breadth to less than a mile.

Surf Islands, upwards of a mile S.S.W. of Bold Bluff, and 3 miles within the entrance of the sound, are a chain of small islands, about 1 mile long in a N.W. and S.E. direction, some of which are covered with a few stunted trees, and are about 40 feet above high water; a short distance from them

are a number of breaking rocks, but 3 cables from their South and West sides are from 10 to 30 fathoms.

Entrance Island, $5\frac{1}{2}$ miles N.W. $\frac{1}{2}$ N. from Reef Point, at the N.W. entrance point of the sound, is small and rocky, about 140 feet high, and covered with a few stunted trees. It is steep-to on its S.E. side.

Danger Rocks, a mile within the entrance, nearly in the fairway, are two very dangerous pinnacle rocks, of small extent, and steep-to on all sides; as they very seldom break, great caution is required, on entering or leaving the sound, to avoid them.

The *North Danger* lies 7 cables E.N.E. from Entrance Island, and breaks at low water. The *South Danger* is half a mile S.E. of the North rock, and is awash at low water spring tides; there is deep water between them.

Bedwell Islet, within the sound on the North side, open North of Bold Bluff in line with the gap in the centre of Surf Islands, bearing N. by E. $\frac{3}{4}$ E., leads nearly a mile south-east of the South Danger. Between the Danger Rocks and Surf Islands, the passage is $1\frac{1}{2}$ mile wide, and clear of danger.

FORWARD INLET, on the North side of the sound 1 mile within the entrance, is about 6 miles long, first taking a north-westerly direction for 2 miles from its outer part, then turning to the N.N.E. for 4 miles, and contracting in breadth; it becomes shoal at the head, and terminates in large salt water lagoons. There are two anchorages within it, North and Winter Harbours, the former easy of access to sailing vessels; both are very secure, and well sheltered.

Entrance and Flat-top Mountains, on the West side of inlet near the entrance, are very conspicuous objects from seaward; the former is 1,275, and the latter nearly 1,000 feet high. *Pinnacle Islet*, three-quarters of a mile N. of Entrance Island, at the S.W. entrance point to Forward Inlet, is a small jagged rock about 40 feet high, with a few trees on its summit.

Robson Island, in the bend of Forward Inlet on the West side, $1\frac{1}{2}$ mile from Pinnacle Islet, is about half a mile in extent, and 400 feet high; its shores are rocky, but at a distance of a cable free of danger on the North and East sides. A small village stands on the East side of Forward Inlet, abreast Robson Island, and close off it is Village Islet, a small bare islet about 40 feet high, which is rather conspicuous.

Bare Islet, lying off the N.E. entrance point to the inlet, is about 12 feet high, and steep to on the outside. *Burnt Hill*, 1,095 feet high, just over the north-east entrance point of Forward Inlet, is remarkable from the southward, being bare of trees and cliffy on its South side; one mile north-east of it is another conspicuous summit, named Nose Peak, 1,730 ft. high, with a bare rocky top.

North Pacific.

North Harbour, which lies to the N.W. of Robson Island, in a bight on the West side of Forward Inlet, is a snug and secure anchorage, about 4 cables in extent, with from 4 to 6 fathoms. The entrance is 3 cables wide, rendering the harbour easy of access to sailing vessels; it is perhaps the best anchorage within the sound, and from being only 4 miles within the entrance is very convenient. *Browning Creek*, in its West part, is $1\frac{1}{2}$ mile long, but very narrow, with from 2 to 5 fathoms water, and terminates in a shallow basin, dry at low water.

Observatory Islet, which lies on the North side of the entrance to the harbour, is a small bare rock, connected at low water to the main; in lat. $50^{\circ} 29' 25''$; long. $128^{\circ} 3' 39''$ W. Variation, in 1862, $23^{\circ} 40' E$.

Winter Harbour comprises that part of Forward Inlet which runs in a N.N.E. direction, and is a capacious anchorage with from 8 to 11 fathoms. Its shores are low, and bordered by a sandy beach, and the harbour becomes shoal at a distance of a mile from the head; its breadth varies from 2 to 6 cables.

Log Point, just outside the entrance of this harbour on the East side, is low, and bordered by a sandy beach; to the southward of it, and extending 4 cables off shore, is the New Bank, with $3\frac{1}{2}$ fathoms on the shoalest part, and contracting the breadth of the entrance passage to the harbour to less than a cable; but by keeping a little over to the West side when abreast North Harbour, a vessel of the largest size may avoid this bank, and enter Winter Harbour without danger.

Pilley Shoal, of 3 fathoms, on the North side of the sound, is of small extent, steep-to on the outside, and marked by kelp. It lies $1\frac{1}{2}$ cable off shore, and 1 mile West from Bold Bluff.

Bedwell Islets, lying $5\frac{1}{2}$ miles within the entrance, off a projecting point on the North side of the sound, are of small extent, wooded, and separated from the shore by a very narrow boat pass, which is conspicuous from the entrance; at 3 cables N.E. of them is the *Monday Shoal*, with 4 fathoms, which is marked by kelp, and steep-to on the outside.

Koprino Harbour, 8 miles within the entrance, in the centre of a bay on the North side of the sound, is a perfectly landlocked but small anchorage, affording room for one or two ships to lie moored within. It lies to the northward of Plumper Island, which is about half a mile in extent, low, wooded, and steep-to on all sides, there being a good passage on either side of it into the harbour.

Dockyard Island, in the West part of the harbour, mid-way between Plumper Island and the North shore, is small, but may be approached close to; there is good anchorage 1 cable South of it, in 14 fathoms. *Wedge Island* lies at the eastern limit of the anchorage, about 1 cable North of Plumper Island; there is a deep passage close to on either side of it into the

harbour. *Observation Islet*, at the N.E. extreme of the harbour, is bare, and about 12 feet high; lat. $50^{\circ} 30' N.$, lat. $127^{\circ} 52' 16'' W.$

East Passage leads into Koprino Harbour, eastward of Plumper Island. It is half a mile wide at entrance, and is clear of danger. *Prideaux Point*, the East entrance point of East Passage, is low, and bordered by a sandy beach.

The North shore of Quatsino Sound from Prideaux Point takes a general north-easterly direction for 9 miles to Coffin Islet, at the entrance of Hecate Cove. From Bold Bluff the South shore of the sound runs nearly parallel to the northern one for 13 miles in a north-easterly direction. It is high, and indented by two bays of considerable size, and some small creeks, none of which afford anchorage.

Limestone Island, 15 miles within the entrance, and in the centre of the sound, is the largest island in the sound, nearly 3 miles long, and about three-quarters of a mile wide in the broadest part. Its shores are rocky, but clear of danger, and the island is of moderate height.

South-East Arm, the entrance of which is a mile East of Limestone Island, and 18 miles within the entrance of the sound, is 10 miles long in a south-easterly direction, and varies in breadth from 3 cables to one mile. Its shores are generally high and rugged, but terminate in low land at the head.

Whitestone Point, at the separation of the two arms at the head of Quatsino Sound, is a rocky point of moderate height, and lies three-quarters N.E. of Limestone Island, abreast Coffin Islet. *Bull Rock*, which covers, and is marked by kelp, lies 3 cables South of it, and 2 cables off shore.

Hecate Cove, on the North shore, about 1 mile N.E. of Coffin Islet, runs in about two-thirds of a mile in a north-westerly direction, is from 2 to 3 cables wide, and affords good anchorage near the centre in 9 to 11 fathoms. The entrance is clear of danger, but in the inner part of the cove, near the North side, are some shoal patches, marked by kelp, with only 11 ft. water in some parts. This cove is convenient for steamers or small craft. *Round Island*, nearly in mid-channel about a mile East of Hecate Cove, and just South of Quatsino Narrows, is small, and of moderate height; there is a clear passage between it and the North shore, but the one South of it is filled with rocks.

Quatsino Narrows, 20 miles inside the sound and connecting it with the Rupert and West Arms, are 2 miles long in a northerly direction; its shores are high and rocky, but at half a cable's distance clear of danger. The tide runs through these narrows at a rate of from 4 to 6 knots, and the streams turn shortly after high and low water.

Rupert Arm, to the N.E. of Quatsino Narrows, is 5 miles long in a north-

easterly direction, and nearly a mile wide; its shores are high and clear of danger. Its head terminates in low land, and a bank dries off it for 2 cables.

West Arm trends in a westerly direction nearly 18 miles from the North part of Quatsino Narrows, and varies in breadth from 2 cables to a mile. Its shores are generally high and rocky; the northern one is indented by several small bays. There are two anchorages, one at Coal Harbour, on the North side, and the other at the edge of the bank, extending from the head.

Coal Harbour, 2 miles from the narrows, on the North side of West Arm, is of square shape, from 3 to 4 cables in extent, and affords good anchorage near the middle in from 12 to 14 fathoms. Indications of coal have been met in its vicinity.

Directions.—Entering Quatsino Sound from the southward, give Reef Point, its S.E. entrance point, an offing of about 2 miles, and steer North till Bold Bluff comes in line with the gap in the centre of the Surf Islands, N. by E. $\frac{1}{4}$ E., which mark kept on will lead S.E. of Danger Rocks; when the West side of Robson Island comes open North of Entrance Mount point in Forward Inlet N.W. by W. $\frac{1}{4}$ W., or Village Islet, on the East side of that inlet, is just touching Brown Point, bearing N.W., a vessel will be well East of these rocks. If bound up the sound, round the North end of Surf Islands at a distance of about half a mile, or if going to Forward Inlet, steer about N.W. by W., taking care not to shut in the South side of Robson Island with Entrance Mount Point, until Bedwell Islets come open North of Bold Bluff, bearing N.E., when she will be well North of the Danger Rocks. Pass from one to two cables off the East side of the Low and Robson Islands, and rounding the North point of the latter, at the same distance, enter North Harbour, and anchor in from 4 to 6 fathoms near its centre.

Entering Quatsino Sound from the westward, keep an offing of about 2 miles, till Entrance Island bears N.E. or N.E. by N., when steer to pass about 2 cables East of it, but not further off. When abreast it haul to the northward, bringing Pinnacle Islet in line with the East side of Low Islets, bearing N.N.W. $\frac{1}{4}$ W., and steer up with that mark on till Bedwell Islets come well open North of Bold Bluff, bearing N.E., when enter Forward Inlet, or proceed further up the sound, as before directed.

The **COAST** of Vancouver Island from Quatsino Sound to Cape Scott, the N.W. extreme of the island, runs in a general W.N.W. direction; it is generally rocky and iron-bound, indented by several bays, mostly small, and from the projecting points some rocks extend in parts nearly a mile off shore. At a distance of 2 miles off are from 20 to 30 fathoms, sand and rock,

deepening to 100 fathoms at 10 to 11 miles off shore; to the southward of the Scott Islands the 100-fathoms line does not appear to extend more than 6 miles from them.

In navigating between Cape Scott and Quatsino Sound, do not approach the shore nearer than 2 miles.

Ragged Point, 3 miles from the North entrance point of Quatsino Sound, is a rocky, rugged point of moderate height. *Open Bay*, which lies just inside it, affords landing for boats in fine weather on its East side. The coast between Open Bay and the entrance to Quatsino Sound is high and cliffy; some rocks extend nearly a mile off it.

Top-knot Point, 5 miles N.W. of Ragged Point, is low, with a summit 300 feet high, shaped like a top-knot, just within it; some rocks extend half a mile to the southward from it. *Raft Cove*, 8 miles from Ragged Point, is an open bight about a mile in extent, and affords no shelter whatever. *Cape Palmerston*, 11 miles north-west from Ragged Point, is a bold, rocky point, rising to a summit 1,412 feet high; some rocks extend half a mile from it.

SAN JOSEF BAY, the entrance to which is 14 miles N.W. from Ragged Point, and 8 miles S.E. of Cape Scott, is an extensive open bay, 3 miles deep in a north-easterly direction; the breadth at the entrance is nearly 2 miles, narrowing gradually towards the head. Its shores are high, and off the South side are several off-lying rocks; the soundings vary from 11 to 4 fathoms, but the bay affords no shelter, except with northerly winds, and should only be used as a stopping place in fine weather.

Sea Otter Cove, just West of San Josef Bay, is about a mile long in a northerly direction, and from 2 to 3 cables wide. There are 5 fathoms in the entrance, and from 1 to 3 fathoms inside it, also several rocks; the shelter within is very indifferent, and the place only fit for a coaster.

CAPE RUSSELL, 16 miles from Ragged point, and immediately westward of Sea Otter Cove, is a remarkable headland 810 feet high, and the outer part of a peninsula formed by Sea Otter Cove and a small bay N.W. of it. Some rocks, which break very heavily, extend nearly a mile South of the cape.

From Cape Russell to Cape Scott the coast, from 500 to 600 feet high, trends in a north-westerly direction, and is indented by three open bays, which are nearly a mile deep, but afford no shelter whatever.

CAPE SCOTT, the N.W. point or extreme of Vancouver Island, is about 500 feet high, and connected to the island by a low sandy neck about one cable wide. Some rocks extend West of it for more than half a mile, and there is a bay on either side of the neck, which would afford anchorage to

boats or small craft in fine weather only; close to its S.W. extreme is a small creek among the rocks, difficult of access, but once within it, boats may get shelter in southerly gales.

The northern and eastern coasts of Vancouver Island will be described in the next Chapter.

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CHAPTER VII.

BRITISH COLUMBIA, ETC.

At the commencement of the preceding Chapter a brief account is given of the history of the hydrography of Vancouver Island, and incidentally of that of the main land adjacent. It will not be necessary to add much to that. Vancouver's survey was an admirable reconnaissance of the shores of the strait, which he made known to the world almost for the first time. But its more important channels and features are now completely represented in the fine series of charts executed from the surveys made by Capt. G. H. Richards, assisted by Commander R. C. Mayne, in 1860.

In this chapter will be included an account of the North-east Coast of Vancouver Island, which lying on the channel which separates it from the continent, could not be well described except in connection with that coast. We follow, therefore, the order in which it is given in the Vancouver Island Pilot.

The country, as is well known, has only been lately thrown open to the world. Prior to 1858, when the British Government resumed possession of it from the Hudson's Bay Company, only a few posts of fur traders existed throughout the land; but in 1857 gold was first discovered (although long before known to exist by the Hudson's Bay Company's officers), by some Canadian emigrants, who successfully "prospected" the banks of the Thompson and Bonaparte Rivers, tributary to the Fraser, and between March and June, 1858, a rush of gold seekers crowded into the country from California, and to this day this continues to be the chief object of its commerce. In 1866 it was estimated that there were 6,000 white inhabitants on the mainland, including 3,000 miners, who produced £600,000 value in gold dust. The native population, most difficult to estimate, was considered to amount to 40,000. The gold fields are far inland, the principal being that called the Cariboo.*

* The excellent Grand Trunk waggon road from Yale (the head of the navigation on the Fraser River) to the centre of the mining district of Cariboo, a total length of 375 miles was completed in 1866, through a country full of engineering difficulties, is a result of which the young colony might be justly proud.

A large portion of the country, especially that near the coast, is unfitted for colonization, owing to its mountainous character.

The *Cascade Range*, through which the Fraser and Harrison Rivers find an outlet to the ocean, is about 60 miles inland, and the Fraser bursts through a gorge in it at about 15 miles above Yale in a succession of terrific rapids or cañons. This part of the river, and of the wonderful road which has been constructed along its banks, is graphically described in the admirable book by Lord Milton and Dr. Cheadle.*

To the northward of Vancouver Island the coast is the western seaboard of the districts formerly known under the names of *New Hanover* and *New Cornwall*. The whole of it is fronted by an immense collection of islands of all dimensions and forms. Within these is a correspondingly extensive series of channels and arms of the sea, forming a most complete chain of inland navigation, which may be pursued for many degrees to the northward, without interruption or exposure to the oceanic swell. It is true that in many parts these canals are too narrow to be very advantageous for sailing vessels to work through, and are therefore more adapted for steam navigation than by other modes; yet the great depth of water, in most parts all but unfathomable, and the boldness of the shores, make this disadvantage of less importance. One feature adverted to by Vancouver, who has excellently surveyed part of this inland navigation, and which is remarkable, is, that caution ought to be used in passing close to some of the projecting points, for he found that, notwithstanding the perpendicularity of the cliffs composing the shores, that a shelf would sometimes project under water, from the general line of the upper portion, a fact which, if neglected, might lead to serious consequences.

Besides these channels the continent is penetrated with numerous and peculiar canals, whose characteristics, greatly similar in all cases, will be best gathered from the ensuing descriptions. There are no rivers, or at least none of importance have been discovered. They are mere torrents, fed in summer by the melting of the snow, and in the winter by the untiring

* In the higher parts of the Fraser, and indeed of all other rivers which flow into it, a remarkable feature, which extends 300 miles, is described in the same work. Along the sides of the mountains which confine the river beds are three terraces—or benches as they are called—perfectly level, and of exactly the same height on each side of the river, evidently the beaches of some lake in former ages of the world's history. The formation of the canon of the lower Fraser suggested their origin to the travellers. They supposed that the gorge through which the river now flows had been partially broken down, perhaps by some grand convulsion of nature at three separate intervals, and thus lowered the surface of the lake, the surf of which had worn the beach it washed to a level strand, to the lower levels as they now appear. See "*The North-west Passage by Land*," by Viscount Milton and Dr. W. B. Cheadle, 1865, pp. 338—347.

deluges of this dismal climate. The Babine, the Nass, and the Skina or Stikine, are the only ones that may be ascended to any distance, and even these only with considerable difficulty and danger.

The primary discovery of the country has been before adverted to, and many of the remarks are as applicable to this as to other portions; but it arose from the zeal and perseverance of two intelligent men, who traded hither under the licence of the South Sea Company. These were Capts. Portlock and Dixon; they made the principal discoveries on the coast subsequent to Captain Cook's visit in his last voyage. Their narratives are, nevertheless, too diffuse, and abound too much with personal narrative and minutiae to afford much general information on the country they visited. It is to the excellent surveys of Vancouver, in 1792, that we owe the greater part of the knowledge we possess of the inland navigation and nautical information of this country.

Besides Portlock, Dixon, and Vancouver, the Spaniards surveyed a portion, and their charts fill up the vacancies left by the other; but of their surveys we have no verbal description to be of service. In the voyages of Meares, previously adverted to, there are also some notices of visitors to this coast during the origin of the fur trade, as before explained, as arising out of the notice afforded by Captain Cook. Then Captain Ingraham visited the S.E. side of Queen Charlotte Island; and Captain Gray, who discovered the Columbia River, first explored it in the *Washington*, which name he applied to it.

STRAIT OF GEORGIA.—Having passed out of the Strait of Fuca by either of the channels described in Chapter VI, pages 274—311 *ante*, when to the north-westward of a line drawn between East point of Saturna Island and Whitehorn Point of the main, a vessel may be considered well in the Strait of Georgia, but before entering upon any description of the latter, it may be well to offer a few remarks on the comparative merits of the two main channels which lead into it, viz., Haro and Rosario Straits; both have their advantages and disadvantages under varying conditions.

Haro Strait is more tortuous; the water is so deep that it would be impossible for a vessel to anchor in the main stream, and for its whole length the tides, though not stronger, are more varying in their direction.

Rosario Strait leads by a very gentle curve almost a straight course into the Strait of Georgia; the depth of water, although considerable, is such that if necessary a vessel might anchor in it; in one part it is somewhat narrower than the narrowest parts of Haro Strait, and the tides run with equal strength; it has its sunken rocks and dangers in an equal degree with the Haro, and perhaps the anchorages in point of numbers and facilities for reaching them are equal in both. Extreme care and vigilance are called for in navigating either with a sailing vessel; to one with steam power, neither offer any difficulties.

A glance at the chart will show that to a vessel bound from sea, or from any of the southern ports of Vancouver Island, to the Strait of Georgia, the Haro Channel is preferable, and it will be equally evident that to reach the same destination from Admiralty Inlet or Puget Sound Rosario Strait is the most direct and desirable. Having entered, however, by either channel, the promontory of Roberts Point will be immediately seen with its conspicuous white-faced cliff, and appearing as an island. From the northern entrance of Haro Strait it will bear N.N.W. 11 miles; and from the Rosario N.W. by W. 15 miles.

The general direction of the Strait of Georgia is W.N.W., and from a position midway between Saturna and Patos Islands, 19 miles on this course should take a vessel abreast the entrance of Fraser River, the sand heads bearing N.N.E., distant 3 miles; and for this distance the breadth of the strait, not including the deep indentation of Semiahmoo Bay, is 10 miles. Continuing the same course for a further distance of 19 miles, will lead between Burrard Inlet on the East, and Nanaimo Harbour on the West, the entrance of the former bearing about N.E. $\frac{1}{2}$ E. 16 miles, and the latter S.W. $\frac{1}{2}$ W. 7 miles.

The breadth of the strait, after passing the sand heads of the Fraser, increases to 14 miles; and between Nanaimo and Burrard Inlet it is 20 miles. The depth of water is from 70 to 100 fathoms between Roberts Point and the western side of the strait, and further to the westward between Burrard Inlet and Nanaimo as much as 200 fathoms in the centre.

The dangers to be avoided in working through the strait are, on the eastern shore, Roberts and Sturgeon Banks; and on the western, the neighbourhood of East Point, and Tumbo Island, and the Coasts of Saturna and Mayne Islands, until beyond the entrance of Active Pass. A chain of reefs and rocky islets lie parallel with this shore, in places extending nearly a mile off; and as the bottom is rocky and irregular, with a considerable strength of tide, vessels are recommended not to approach it within 2 miles.

It should also be remembered that the ebb sets to the S.W., through Active Pass, and that tide races occur in its northern entrance. Roberts Bank is easily avoided, especially since the establishment of the lightvessel in 1866. If the weather is thick, when 50 fathoms is struck, a vessel will be getting very near the edge.

The Tides, although not nearly so strong as among the Haro Archipelago, yet run with considerable strength, as much as 3 knots, particularly during the freshets of summer, when the Fraser River discharges an immense volume of fresh water, which takes a southerly direction over the banks, and almost straight for the mouth of Active Pass. This peculiar milky-coloured water is frequently carried quite across the strait, and is sometimes seen in the inner channels washing the shores of Vancouver Island; at other times

it reaches the centre of the channel only, forming a remarkable and most striking contrast with the deep blue waters of the Strait of Georgia.

Below the mouth of the Fraser, the tide is rather the stronger on the western shore. On the eastern side, within the line between Roberts and Sandy Points, scarcely any tide is felt; and vessels will gain by working up on that shore with the ebb, where good anchorage can also be found, if necessary.

Allowance must be made for the tides, which is not difficult, having once entered the Strait of Georgia by daylight, and knowing which tide was running.

The **COAST** of the Washington Territory, to the southward of the boundary separating it from British Columbia, has been previously described in pages 268—270. We commence with the promontory to the southward of the entrance of the Fraser River.

ROBERTS POINT is the termination of a remarkable promontory which stretches southerly from the delta of the Fraser River. It presents a broad face to the southward, and its southern extreme is a little more than $1\frac{1}{2}$ miles South of the 49th parallel of latitude; the eastern point of the promontory is a remarkable white-faced cliff, 200 feet high, its summit crowned with trees. From it the land gradually falls to the westward and terminates in Roberts Spit, a low shingle point, within which is a small space of level clear land, where a few wooden buildings were erected on the first discovery of gold in the Fraser River, and named Roberts Town; for a few months it served as a depot for the miners, but it has long been deserted.

From this spit the coast trends to the N.N.W., with bluff shores of moderate height for $3\frac{1}{4}$ miles, when it merges into the swampy delta of the Fraser. From most points of view, and particularly from the southward, Roberts Point presents the appearance of an island. Shoal water, and rocky irregular bottom, on which kelp grows in summer, extends for more than a mile E.S.E. from the white face of the point, and vessels are recommended to give it a good berth.

Anchorage will be found on either side of the promontory; to the eastward in 9 fathoms, sandy bottom, with the extreme of the white cliff bearing W.S.W. distant $1\frac{1}{4}$ mile; Roberts Spit, the western termination of the promontory, should be just shut in by the white cliff. To the westward of the spit there is fair anchorage in 8 fathoms good holding ground, with the spit extreme distant three-quarters of a mile, and in one with Mount Constitution on Orcas Island bearing S.E. $\frac{1}{4}$ E., a white flagstaff at the North end of the low land of the point N.E. by E. $\frac{1}{4}$ E., and the bare bluff of the 49° parallel or the monument on its summit N.W.; here the edge of the bank will be distant a quarter of a mile, and a ship should not anchor any further to the northward, as the Roberts Bank trends rapidly to the westward.

There is a granite monument 25 feet high erected on the summit of the

parallel bluff, which is only just visible from the anchorage on account of the trees; it marks the boundary between the British and United States possessions, and is mentioned on page 269 previously.

Ships should not lie at this anchorage with strong southerly or westerly winds, but should shift round to the eastern one, or to Semiahmoo Bay, which is always safe, and anchorages in almost any part.

ROBERTS BANK, caused by the sediment deposited by the stream of the Fraser River, extends from the spit of Roberts Point in a W. by N. direction for $9\frac{1}{2}$ miles, to the Sand Heads or river entrance, and at this point is 5 miles from the shore; it then takes a N.N.W. direction for a further distance of 12 miles, joining Grey Point on the North, as it does Roberts Point on the South. The portion of the bank northward of the Fraser has been named the Sturgeon Bank; it is steep-to, and a mile outside the edge the soundings are from 70 to 60 fathoms, then 20, and immediately 2 fathoms.

FRASER RIVER, in point of magnitude and present commercial importance, is second only to the Columbia on the N.W. coast of America. In its entire freedom from risk of life and shipwreck, it possesses infinite advantages over any other river on the coast, and the cause of this immunity from the dangers and inconveniences to which all great rivers emptying themselves on an exposed coast are subject, is sufficiently obvious. A sheltered strait, scarcely 15 miles across, receives its waters; and the neighbouring Island of Vancouver serves as a natural breakwater, preventing the possibility of any sea arising which would prove dangerous to vessels even of the smallest class, unless they ground.

To the same cause may be attributed in a great measure the fixed and unvarying character of the shoals through which this magnificent stream pursues its undeviating course into the Strait of Georgia; and there can be little doubt that it is destined, at no distant period, to fulfil to the utmost as it is already partially fulfilling, the purposes for which nature ordained it—the outlet for the products of a great country, whose riches in mineral and agricultural wealth are daily being more fully discovered and developed.

The river, with its numerous tributaries, has its rise in the rocky mountains, between 400 and 500 miles from the coast in a northerly direction, from whence it forces its way in torrents and rapids, through one of the many great parallel valleys which intersect this region, confined by gigantic mountains, with large tracts of country, rich in agricultural resources on either side of them, until it reaches the town of Hope,* which is about 80 miles by the windings of the river, in an easterly direction from its entrance.

* Hope is an old station of the Hudson's Bay Company. Its site is the most beautiful in British Columbia—a wooded level shut in by an amphitheatre of lofty mountains—Yale

Above the City of Lytton, which stands at the fork or confluence of the Fraser and Thompson Rivers, 55 miles above Hope, many rich deltas occur, or as they are termed by the miners, bars, and among these known as the wet diggings, gold was first discovered in British Columbia.

At Hope the river assumes the character of a navigable stream; steamers of light draught reach this point and even the town of Yale, 15 miles above it, during from six to nine months of the year. In June, July, and August, the melting of the snow causes so rapid a downward stream that vessels, even of high steam power, are rarely able to stem it, and during these months numbers of large trees are brought down from the flooded banks, which offer another serious obstruction to navigation. Between Hope and Langley, the latter 30 miles from the river's mouth, there is always a considerable strength of current from 4 to 7 knots, at times more; but at Langley the river becomes a broad, deep, and placid stream, and except during the three summer months, the influence of the flood stream is generally felt, and vessels of any draught may conveniently anchor. The depth is 10 fathoms; the current not above 3 knots.

Midway between Langley and Hope the Harrison River falls into the Fraser and by it a long chain of lakes extending in a general N.W. direction, a comparatively easy route has been established, by which the Upper Fraser is reached at a point just below the Bridge River, in the heart of the gold region, thus avoiding that difficult and at present almost impassable part of the country between the town of Yale and the Fountains, by the main river a distance of about 90 miles.

Vessels of 18 feet draught may enter the Fraser near high water, and proceed as high as Langley with ease, provided they have or are assisted by steam power. The only difficulty is between the Sand Heads and Garry Point, the entrance proper of the river, but while there are competent pilots, and the buoys remain in their positions, this difficulty disappears. The lightship is a sufficient guide for making the entrance. It must be remembered, however, that the tides of the strait of Georgia sweep across the channel of the entrance, and a large ship is recommended to enter or leave with the last quarter of the flood.

The great quantity of deposit brought down by the freshets of summer, has created an extensive series of banks, which extend 5 miles outside the entrance proper of the river. The main stream has forced an almost straight though somewhat narrow channel through these banks, and at its junction with the current of the strait of Georgia, which runs at right angles to it,

upon a grander scale. Before the discovery of the Cariboo mines, it was a place of considerable importance, but has now "caved in," and become desolate.—Viscount Milton and Dr. Cheadle, p. 348.

has caused the wall-edged bank before alluded to, extending to Roberts Point on the South and Grey Point on the North.

The river is at its lowest stage during the months of January, February, and March. In April it commences to rise from the melting of the snows, and is perhaps 2 feet above its lowest level; the flood stream is strong enough to swing a ship at New Westminster up to the end of this month. In May the water rises rapidly, the river is at its highest about the end of June, and remains up with trifling fluctuations until the end of July or middle of August. During these six weeks the banks are overflowed, and extensive plains above Langley covered for a space of several miles; the strength of the stream between Langley and Hope being from 4 to 7 knots, and in the narrow parts even more. The usual rise of the river at Langley due to these floods is about 14 feet, but from the testimony of an officer of the Hudson's Bay Company, who has resided more than 30 years there, it has been known to reach 25 feet.

From the middle to the end of August the waters begin to subside, and in September the stream is not inconveniently strong. September, October, and November are favourable months for the river navigation, as the water is then sufficiently high to reach Hope, and the strength of the current considerably abated. The shallow stern wheel steamers have got to Hope as late as December; between this month and April, owing to the shoalness of the water, and the great quantity of ice formed, navigation even by these vessels only drawing 18 inches, is attended with great difficulty, and rarely practicable at all. The snags or drift trees which become imbedded in the river, also form a serious obstacle to navigation at this season.

In April, the steamers commence again to run. In June, July, and August, the rapidity of the current is the great obstacle, but these high-pressure vessels commanding a speed of 11 and 12 knots frequently accomplish the voyage, though at much risk.

The Harrison River route (page 381) obviates some, but not all of these difficulties. At New Westminster the freshets raise the level of the river about 6 feet, but the banks being high no inconvenience is felt, and the strength of the stream is rarely 5 knots, during the winter from 2 to 3; for some miles within the entrance the low banks are partially flooded for a month or six weeks. The rise and fall due to tidal causes is from 8 to 10 ft. at springs, between the Sand Heads and the entrance of the river proper at Garry Point; at New Westminster it is 6 feet, and at Langley scarcely perceptible.

The Lightvessel, which was placed off the entrance in 1866, lies in 10 fathoms on the South Sand Heads. She is painted red, with her name in white letters. She has two masts, and a red ball on the mainmast. By night she shows a *fixed light* at 54 feet, seen 10 miles off. In foggy weather a bell is sounded.

There are no natural marks sufficiently well defined, or which are not too distant, or too liable to be obscured in cloudy weather, to enable a vessel by their help alone to hit the narrow entrance between the Sand Heads with accuracy, or without the aid afforded by the lightvessel on the South Sand Head. The northern edge of the channel within is marked by spar buoys, for the colour of which see chart.

When up with the lightvessel at the entrance, a remarkable solitary bushy tree will be seen on Garry Point, the northern entrance point of the river proper, straight for which is the general direction of the channel. It bears from between the Sand Heads N.N.E. a little easterly, and is just 5 miles distant. Although to steer direct for this tree would not clear the outer edges of either bank for the whole length of the channel, yet it will be found an excellent guide, to give almost the straight line in, should the buoys be removed.

The South Sand Head dries before low water, and has frequently a ripple on it when covered; when near the lightvessel, it should be brought to bear N.N.E., and then steer to leave it a cable's length on the starboard side, which will lead nearly in mid-channel, the buoys then on the port or North side of the channel should be kept from half a cable to a cable on the port hand. The least depth in the channel is 11 or 12 feet at low water, and this occurs about midway between the Sand Heads and Garry Point; at or near high water from 18 to 20 feet, and sometimes 22 feet, may be carried into within $1\frac{1}{2}$ mile of Garry Point, when it deepens to 4 and 5 fathoms; the point should be passed close.

There is always a great quantity of drift wood on the point, and the northern side of the river should be kept aboard for nearly 2 miles, where from 8 to 10 fathoms will be found; it is then necessary to cross to the South side, and to keep close along it, passing the mouth of the South or Boat Channel, nearly 2 miles above which, and abreast a clump of high trees, cross again to the North bank to the left of two low sandy islands; the channel then leads rather along the North side of the river, and with the assistance of the chart will be found sufficiently easy for vessels of 20 feet draught until 6 or 7 miles above Langley.

It is not, however, recommended for a stranger to enter without a pilot.

NEW WESTMINSTER, at first chosen as the capital of British Columbia, a dignity now ceded to Victoria, stands on the North or right bank of the Fraser River, just above the junction of the North Fork, and 15 miles in a general north-easterly direction from the entrance proper. It occupies a commanding and well chosen position, being within an easy distance of the entrance, and having great facilities for wharfage along its water frontage, a good depth of water, and excellent anchorage.

The river bank is somewhat precipitous in places, and the country at the back is like all the lower parts of the Fraser (unless, indeed, in the

immediate neighbourhood of the entrance, where it is swampy grass land, subject to inundation during the freshets of summer), densely wooded; a considerable clearing, however, of the timber has taken place in the vicinity of the town, which already assumes a prominent and thriving aspect, and when the facilities for entering the river and its capabilities are better known, will no doubt rise more rapidly into importance.

The military establishment or camp of the Royal Engineers, a mile above New Westminster, is a most picturesque spot, commanding an uninterrupted view of the Queen's Reach, a broad, deep, and magnificent sheet of water. From the camp to Port Moody, an excellent harbour at the head of Burrard Inlet is 4 miles in a North direction; a good trail exists between the two places, and a waggon road is in course of construction to the outer harbour of the inlet, which, when completed, will be an important work. At 5 miles eastward of New Westminster is the entrance to the Pitt River, which runs in a general direction from N.N.E. to N.E. for 28 miles, terminating in two remarkable lakes enclosed between almost perpendicular mountains, and navigable to the head for vessels of 14 feet draught, the depth in places being far too great for anchorage. A large tract of low grass land lies on both sides of the entrance of the Pitt, which, however, is generally overflowed, or partially so, during six weeks of summer.

DERBY or NEW LANGLEY is 12 miles above New Westminster in an easterly direction, on the South or opposite side of the river; the channel between is deep, and there are no impediments to navigation. This spot was first selected as the capital, and as a town site it is unobjectionable, having a considerable tract of good cleared land in its neighbourhood, and all the requirements of a commercial port; the depth of water here is 10 fathoms. Large vessels may proceed with ease 7 miles beyond Langley, the navigation then becomes somewhat intricate, and the current too rapid for any vessels but steamers of light draught and great power.

The **NORTH FORK** is another entrance to the Fraser, navigable for vessels drawing 6 or 8 feet water, and is generally used by the natives proceeding to or from Burrard Inlet. Its junction with the main stream occurs immediately below New Westminster, from whence it runs in a westerly direction, and enters the Strait of Georgia through the Sturgeon Bank, about 5 miles northward of the Sand Heads; a large low partially wooded island lies in its entrance, and splits the channel into two arms.

In many parts of the North Fork the water is deep, in holes, and the bottom irregular; it can only be considered a boat channel.

BURRARD INLET is the first great harbour which indents the shores of British Columbia North of the 49th parallel. It is the Brazo de Florida Blanca of Galiano and Valdez. Its entrance, which is between Grey Point on the South and Atkinson Point on the North, is 14 miles N.N.W. from the Sand Heads of Fraser River, 20 miles N. by E. from Portier Pass, and 21

miles N.E. $\frac{1}{2}$ E. from Entrance Island of Nanaimo. Howe Sound immediately adjoins it on the North, Atkinson Point, the northern entrance point of the inlet, being the eastern limit of the sound.

The entrance of the inlet is well marked; *Grey Point*, a long wooded promontory terminating in a rounded bluff, is very conspicuous from the southward, while *Bowen Island*, which lies at the entrance of Howe Sound, and may also be said to form the northern boundary of the inlet, is very remarkable; its high round and almost bare summit, *Mount Gardner*, reaching an elevation of 2,479 feet, is easily recognised from any point of view. Passage Island, small but prominent, lies in the eastern passage of Howe Sound, midway between Bowen Island and Atkinson Point, and is an excellent mark from the southward; as before observed, Anvil peak, on with or just open westward of this island bearing N. by W. $\frac{1}{2}$ W., clears the edge of the Sturgeon Bank.

Burrard Inlet differs from most of the great sounds of this coast in being extremely easy of access to vessels of any size or class, and in the convenient depth of water for anchorage which may be found in almost every part of it; its close proximity to Fraser River, with the great facilities for constructing roads between the two places, likewise adds considerably to its importance. Owing to these advantages, and from its possession of unbounded pine forests, two saw mills were completed in 1866, which now produce large quantities of excellent timber, especially from the Douglas pine. It is divided into three distinct harbours, viz., English Bay, or the outer anchorage, Coal Harbour above the first Narrows, and Port Moody at the head of the eastern arm of the inlet.

English Bay is more than 3 miles in breadth at the entrance between Grey and Atkinson Points, which bear from each other N.N.W. and S.S.E., and carries the same breadth for nearly its entire length or almost 4 miles; it is contracted in some measure, however, by the Spanish Bank, dry at low water, which extends in a northerly direction from Grey Point three-quarters of a mile, and then curves easterly.

This anchorage is well protected from westerly winds by the Spanish Bank, and as there is a good rise and fall of tide, as much as 16 feet at springs, and a clean shelving sandy beach at the creek, it would be a desirable place to beach a ship for repairs. The head of English Bay on the S. shore terminates in a shoal arm, named *False Creek*; on the North shore it leads by the First Narrows to Coal Harbour.

Coal Harbour is on the South side of the inlet, 2 miles within the First Narrows. Vessels intending to pass above the Narrows must attend to the tides, and a stranger will do well to anchor in English Bay before proceeding higher up.

The *First Narrows* lie between the bluff of Coal Peninsula and the North side of the inlet, where the breadth of the channel is not more than $1\frac{1}{2}$ cable

North Pacific.

with a depth of 12 fathoms. When at the entrance of the Narrows, the mid-channel course is E. by S. $\frac{1}{4}$ S. for $1\frac{1}{4}$ mile, when the inlet is again reached.

The strength of the tide in the narrowest part of the First Narrows is from 4 to 8 knots. The only directions necessary for a steamer are to keep the South shore aboard, and to be quick and careful with the helm; small craft may go through with ease, the tide being favourable; to a sailing ship a knowledge of the locality is necessary.

It is high water, full and change, at Burrard Inlet, at 6 p.m.; and the rise is 16 feet. The ebb stream commences directly it is high water by the shore, and runs out for two hours after it is low. There is consequently only 4 hours' flood stream.

Between the First and Second Narrows, a distance of $4\frac{1}{4}$ miles, the course of the inlet is E. $\frac{1}{4}$ N., varying in breadth from half to $1\frac{1}{4}$ mile. The *Second Narrows* are similar to the First. A bank of the first description, but more extensive, is caused by the deposit brought down from the high mountains by the numerous streams which empty themselves into the inlet on the North side. The channel is straight, and the tides which run from 3 to 7 knots set fairly through it. The only directions necessary are to keep the South shore close aboard, and steer from point to point.

Port Moody.—The entrance of this snug harbour is 4 miles eastward of the Second Narrows, at the head of the eastern arm of the inlet. It is 3 miles in length, and varies in breadth from a third to half a mile, except at its entrance, where it is only 2 cables across; there are no dangers, and a uniform depth of water, with good holding ground. Abreast the turning point, and on the North shore, a bank dries off it for nearly 2 cables at low water, on which good oysters are found.

North Arm, just before reaching Port Moody, and 3 miles above the Second Narrows, branches off from the main inlet, and runs in a general northerly direction for 11 miles. It is entirely different in its character from other portions of the inlet. The depth of water varies from 50 to 110 fathoms, and it is enclosed on both sides by rugged mountains rising from 2,000 to 5,000 feet almost perpendicularly, and down the steep sides of which the melting snow in summer forces its way in foaming cascades, rendering the surface water in the inlet below all but fresh.

During the winter months *fresh water* is to be obtained in all parts of Burrard Inlet, and probably the whole year round there would be no scarcity; in June there is abundance at the creek in English Bay, off which is the anchorage. In Port Moody there is a fine stream close to the oyster bank.

SOUTHERN SHORE OF THE STRAIT OF GEORGIA.

GABRIOLA REEFS are a dangerous cluster of rocks, some of which cover at half flood, others having a few feet water over them. They lie 2 miles off the eastern point of Gabriola Island, mentioned on page 311 *ante*, 8 miles below the entrance of Nanaimo Harbour, and cover a space of half a mile. From the North point of Portier Pass, the outer extreme of the reef bears N.W. $\frac{1}{2}$ N. 8 miles; and from the easternmost of the Flat-top Islands, a group of low wooded islets lying close off the East end of Gabriola Island, E. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles. There is a passage inside the reefs, but it is not recommended.

The marks most convenient for vessels coming from the southward are to keep the North and S.W. entrance points of Portier Pass just touching, on a bearing S.S.E. $\frac{1}{2}$ E., which will lead more than a mile eastward, and working up, while the first summit of Gabriola Island inside Berry Point is open clear of the Flat-top Islands, the reef will just be cleared.

Westward of Flat-top Island the shore of Gabriola is bold until near Berry Point and Entrance Island, when it should not be approached within a long half mile. Foul ground extends for some distance eastward of the point of the island.

Entrance Island lies half a mile N.N.E. of Berry Point, the N.E. extreme of Gabriola Island. It is rocky, 30 feet high, formed of sandstone, bare of trees, but has some vegetation on it. Vessels passing up the strait bound for Nanaimo should round this island. There is a deep passage between it and Berry Point named Forwood Channel, something more than 2 cables in breadth, which steamers or small craft may use; but the South and West sides of Entrance Island must be avoided, as reefs and broken ground extend 2 cables off them.

Having rounded this island at the distance of half a mile, or more if convenient, the entrance of Nanaimo Harbour will be distant 5 miles. There are three channels leading to the harbour, viz., Fairway, Middle, and Inner. Fairway Channel is the most convenient for vessels bound to Nanaimo from the southward or eastward; but Middle Channel is certainly the safest and most desirable for vessels from the northward.

Fairway Channel is the most direct for vessels entering from the southward or eastward. It lies between the shore of Gabriola and Lighthouse Island, which is a smooth-topped, grassy, sandstone island, 3 cables in extent North and South, about 50 ft. high, and bears from Entrance Island W. by S. $\frac{1}{4}$ S. 3 miles. A ledge of rocks 4 cables long in a North and South direction, lies E.S.E. nearly half a mile from the island. The depth of water is 9 feet on its northern edge, and 20 feet on its southern. The ledge is generally covered with streaming kelp, and has a channel of 7 fathoms

water between it and the island; its North edge bears from the South point of Lighthouse Island N.E. by E. 3 cables, and its South end E.S.E., nearly half a mile.

The breadth of Fairway Channel between this ledge and Rocky Point of Gabriola Island is full three-quarters of a mile. For a distance of 2 cables off the latter point from 4 to 7 fathoms, rocky bottom will be found, where occasionally kelp grows, but nothing exists which would bring a ship up. A mid-channel course is recommended, which from a berth half a mile off Entrance Island is S.W. $\frac{1}{2}$ W. for 3 miles. The water is deep, and the bottom irregular, varying from 15 to 40 fathoms. If to the southward of mid-channel it will shoal to 15 fathoms, and shortly to 8 fathoms off Rocky Point.

DIRECTIONS.—Having entered the Strait of Georgia, between East point of Saturna and Patos Island, a W.N.W. course for 38 miles will lead nearly 3 miles outside Gabriola Reefs, and abreast Entrance Island, the latter bearing S.W., distant 5 miles. A vessel proceeding through Fairway Channel, if northward of mid-channel must keep a look-out for the kelp on Lighthouse Island ledge; when Lighthouse Island bears N.W. steer S. $\frac{1}{2}$ W., which leads for the entrance of Nanaimo Harbour, distant a little over 2 miles. Strangers should be careful not to mistake for it Northumberland Channel, which latter lies from Lighthouse Island in a S.S.E. direction, between the high cliffy West coast of Gabriola Island and Sharp Point, a remarkable narrow projection on the main, and off which, at the distance of half a cable, is a rock which uncovers.

Having passed between Lighthouse and Gabriola Islands, there is a good working space of $1\frac{1}{2}$ mile in breadth, between Gabriola on the East and Newcastle and Protection Islands on the West, but the water is too deep for anchorage. The shores of the latter islands should not be approached within a quarter of a mile, as shoal rocky ledges extend off them. Having brought Gallows Point, the southern extreme of Protection Island, to bear S.W. $\frac{1}{2}$ W., the town will open out.

A vessel may anchor, if necessary, with the high-water mark of Gallows Point bearing W.N.W., distant a quarter of a mile, which will be in the fairway of the entrance, but it is difficult for a sailing vessel to pick up a berth here with a strong breeze, as the space for anchorage is confined.

NANAIMO HARBOUR, when the banks are covered, gives the idea of a large sheet of water, but the deep part is limited.

The entrance lies between Gallows Point and the southern bank. A rocky ledge extends for $1\frac{1}{2}$ cable on every side of the point, and in summer is marked by kelp; a large boulder stands on the ledge off the point, distant 150 yards, and covers before high water. The South side of the channel is the northern edge of the great shallow bay to the southward, which,

although it does not quite dry in this part, has only 2 or 3 feet on it at low water, and is steep-to. The entrance is here marked on either side by a spar buoy about a cable apart in a North and South direction; within them the harbour opens out, but in its centre is the Middle Bank, 2 cables long in a northerly direction, and half a cable broad, with a spar buoy on either end. Two narrow winding channels, the North and South, lead into the usual anchorage, which is close off the town, and westward of the Middle Bank. Both are buoyed in the vicinity of the latter, but no stranger should enter either channel without a pilot.

A remarkable white patch on the cliffy shore of Gabriola Island just open northward of the extreme of Sharp Point, the latter bearing E. by N. $\frac{1}{2}$ N., leads through the channel until near Gallows Point, which should be rounded at a little more than a cable's length. In the North channel two spar buoys will then be seen, a cable's length apart, the southern one on the North end of the Middle bank, the North one on South edge of the Satellite Reef; steer about West to pass between them, then haul close round the southern buoy, and steer for the Mine Chimney. Anchor close off the town in 5 fathoms, midway between the buoy and Beacon Rock, which dries at low water, and has a buoy on it. The South channel, though of sufficient depth for large vessels, has a somewhat sharp turn at its western end, but is very convenient for vessels leaving with a northerly wind, when they would be obliged to warp out of the North channel.

COAL.—The mines of Nanaimo produce a fair bituminous coal, which answers well for steaming purposes. It is lighter by about 10 per cent. than Welsh coal, and its consumption proportionately rapid. The working of the mines have not yet been undertaken on a scale commensurate with their importance, probably owing to the demand having been hitherto comparatively small. As the quality of the coal, however, is becoming better known, the demand is rapidly increasing. It is now exported to California in large quantities, and ships are inconveniently detained waiting for cargoes. Some new and very promising seams have lately been discovered by boring, and the quality is said to be superior to any hitherto found.

Newcastle Island produces large quantities, and the mines there are being rather extensively worked. The Nanaimo coal is far superior to any that has yet been discovered or worked in this country, and there can be little doubt but that it exists in sufficient quantities to supply the whole Pacific coast for almost an indefinite period. The present price is 25 shillings, or 6 dollars per ton.

Departure Bay.—A long narrow channel or arm between Newcastle Island and the main leads in a N.W. direction from Nanaimo Harbour to Departure Bay. It is $1\frac{1}{2}$ mile in length, and a cable in breadth, with 12 ft. at low water, except on a rock, which has only 2 feet on it, lying in the centre, 2 cables north-westward of Rocky Point, the South point of Newcastle

Island. Vessels of 15 or 16 feet draught may enter Departure Bay by this channel at suitable times of tide, but large vessels must enter northward of Newcastle Island.

From Lighthouse Island, the entrance of Departure Bay bears S.W. $\frac{1}{2}$ W., distant 2 miles, and lies between the steep cliffy North point of Newcastle Island, and a small island to the northward of it. The breadth of this channel is 3 cables, and the depth 20 fathoms. Little less than this depth will be found in any part of the bay, and it is not nearly so sheltered as Nanaimo Harbour.

Vessels intending to load with coals (and there is no other inducement to anchor here), should bring the steep North point of Newcastle Island to bear N. by E., and anchor in not less than 18 fathoms, off the coal mine, 2 cables from the shore; the bank runs up steep within this depth, and shoals from 12 to 2 fathoms. Unless anchored well out, a vessel is liable, with N.W. winds, to tail on the bank; and ships are not recommended to lie here after they have got their cargo in. A stranger should take a pilot for the coaling station in Departure Bay, either from outside or in Nanaimo Harbour.

Middle Channel lies between Lighthouse and Five-finger Island, $1\frac{1}{2}$ mile W.N.W. from it. The latter is a bare rugged islet of about the same dimensions as the former, but of trap formation, instead of sandstone; the five hummocks on it resemble knuckles more than fingers. The channel is perfectly free from danger, and has a depth of 80 fathoms.

S.S.W. of Five-finger Island are three smaller islets of similar character and formation, with some rocks about them which uncover. *Inner Channel*, 4 cables in breadth, lies between the above islets and the shore of the main, and being more direct, is convenient for steamers or small craft.

Tides.—It is high water, full and change, at Nanaimo Harbour, about 5 p.m., and the range of tide is sometimes 16 feet, which is as much as is met with anywhere on the coast, and makes this a most eligible spot for the construction of docks, for which it offers peculiar facilities. This great range of tide only occurs at midnight during winter, and in the daytime in summer. The superior and inferior tides exist here as they do at Esquimalt and among the Haro archipelago. On the opposite coast, at Burrard Inlet, this irregularity does not exist.

NORTHUMBERLAND CHANNEL, before mentioned as lying between Sharp point and the western shore of Gabriola Island, runs in a S.E. direction for $1\frac{1}{2}$ mile, and then East for 2 miles, when it enters the Dodd and False Narrows, the former on the South side of Mudge Island, the latter on the North; a rock, which uncovers extends half a cable off the extreme of Sharp Point. False Narrows are shoal, with no ship passage.

Dodd Narrows have been already described from the southward. They communicate with the inner channels leading to the southern ports, and

save a distance of 20 miles in the passage from Nanaimo to Victoria or Esquimalt.

The **STRAIT OF GEORGIA**, as already observed, commences at the northern end of the Haro Archipelago, and extends in a general W.N.W. direction to Cape Mudge, a distance of 110 miles. There are many harbours, both on the Vancouver and continental shores, and several islands, some of considerable size, form other channels, all of which are navigable.

The average width of the main strait westward of Nanaimo is about 9 miles, diminishing at its narrowest part between Lasqueti and the Ballinae Islands, to 5 miles. The general depth of water is great, frequently over 200 fathoms. The tides are not strong, and between Nanaimo and Cape Mudge there are few dangers in the way of ships navigating the strait.

The smaller channels on the continental shore are Malaspina Strait and Sabine Channel, the former lying between the continent and Texhada Island, the other separating Texhada from Lasqueti Island.

On the Vancouver shore is Ballinae Channel, lying westward of the islands of the same name; also Lambert Channel and Baynes Sound, the former between Hornby and Denman Islands, and the latter dividing both from Vancouver Island; they will be separately described.

Tides.—The meeting of the tides takes place between Cape Mudge and Cape Lazo; that is to say, the flood entering by Fuca Strait meets that entering by the North end of Vancouver Island, within 20 miles of the former cape, generally much nearer, but varying according to the phases of the moon and the state of the winds; and at the point of meeting a considerable race occurs, which would be dangerous to boats; there is generally such a race at the entrance of Discovery Passage. It is high water, full and change, at Cape Mudge and Cape Lazo at about 5.30, and the range during ordinary springs is from 12 to 14 feet. At the entrance of the passage during springs the stream runs as much as from 4 to 6 knots an hour, the flood or easterly stream being the strongest.

NANOOSE HARBOUR, at 8 miles westward of Nanaimo, will be known by the remarkable hill called Nanoose or Notched Hill, which rises between 600 and 700 feet immediately over its North side, and shows as a double or notch peak from the southward.

The shore westward of Nanaimo is free from danger, and at the distance of half a mile 20 fathoms will be found. Off the North point of the harbour lie a group of small wooded islands; the entrance is between *Maude Island* (the southernmost of them) and *Blunden Point*, on the South shore of the main, and is here nearly three-quarters of a mile in width. *Entrance Rock*, 2 feet above high water, and $1\frac{1}{2}$ mile within Blunden Point, extends off a low maple flat on the South side almost into the middle of the harbour, and contracts the width of the entrance here to a quarter of a mile; within this the harbour opens out to nearly a mile in width, and terminates at the dis-

tance of $1\frac{1}{2}$ mile in a shoal mud flat, which dries at low water more than half a mile, and where abundance of oysters are found. The only danger on the North shore, in entering, is the *North Rock*, which lies nearly 2 cables from the shore, and has 5 feet on the outer part. It is a spacious and well-sheltered anchorage from all winds.

Fresh water may be obtained from a cove at the head on the North side, and there is a convenient nook with a steep shingle beach, where a vessel might be laid for repairs, if necessary, on the same side, a mile from the head.

It is high water, full and change, at 5 p.m., and springs range 15 feet.

The **COAST**, for 6 miles westward of Nanoose, is strewn with numerous small islands and reefs, the latter generally marked by kelp. The outermost of them, *Winchelsea* and *Yeo Islands*, extend between 1 and 2 miles from the land, and beyond these there are no hidden dangers. The *Grey Rock*, bare, 12 feet above high water, and rather remarkable, lies 2 cables E.N.E. from the East end of the Winchelsea group.

Rudder Reef, with a fathom on it, lies a quarter of a mile S.E. $\frac{1}{2}$ E. from Grey Rock, and has very little kelp on it. This reef must be avoided by vessels bound westward from Nanoose Harbour, and the S.E. end of the Winchelsea Islands should be given a berth of at least half a mile.

Ballinac Islands, two in number, are larger than the groups just described, and lie further off shore. They are about 250 ft. high; the northernmost one has but two or three trees, and its summit terminates in a sharp bare nipple; the southernmost is wooded. They have the appearance of one island seen from all points. The islands are steep and bold on all sides, and are conspicuous after passing westward of Nanaimo. Vessels bound through the Strait of Georgia would do well to steer for them.

Ballinac Channel lies southward of the islands, between them and the smaller group which extend off the coast westward of Nanoose. It is a safe, clear passage, $1\frac{1}{2}$ mile in width at its narrowest part, which is abreast Gerald Island. The depth in mid-channel is 136 fathoms, and the shores of the islands on both sides may be approached within a cable's length, if necessary. The only danger in the channel in working through is *Cottam Reef*, which has $2\frac{1}{2}$ fathoms on it, and is generally marked by kelp. It lies on the southern side. To steamers, coasters, or vessels with a fair wind, Ballinac Channel is recommended.

North-west Bay is 5 miles westward of Nanoose. *Mistaken Island*, low, wooded, and half a mile long, lies immediately off its northern entrance point, and S.W. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles from the North Ballinac Island. The bay indents the coast for 2 miles in an E.S.E. direction, making the peninsula of the land which separates it from Nanoose Harbour. It is much exposed to N.W. winds, and the water in it is very deep.

From North-west Bay the land trends, with a slight indentation, nearly

West for 19 miles to Denman and Hornby Islands, and to the southern entrances of Baynes Sound and Lambert Channel. The land between Nanaimo and the Komox district, a distance of 24 miles, is undulating, and of a moderate height, from the sea-coast to the base of the mountain ranges, a distance of about 4 miles.

Qualicum River empties itself on this coast, 30 miles westward of Nanaimo, and 5 miles eastward of the eastern entrance of Baynes Sound. It is a small stream, only noticeable as affording shelter to canoes or boats within its entrance, and as being the terminus of the trail between the head waters of Barclay Sound and the eastern coast of the island, a distance of only 13 miles in a direct line. *Qualicum Bay* is a slight indentation of the coast, immediately West of the river, where very fair anchorage will be found in 8 or 10 fathoms, three-quarters of a mile from the shore.

The mountain ranges westward of Nanaimo are of considerable height, and very striking in their general features and varied outlines. Most conspicuous amongst them, and midway between Barclay Sound and the East coast, rises *Mount Arrowmith* to a height of 6,000 feet. Its remarkable summit, terminating in three sharp, well-defined peaks, is rarely free from snow.

Denman and Hornby Islands lie immediately off the coast, 34 miles westward of Nanaimo; the former is 9 miles long in a W.N.W. direction, or parallel with the coast, low and generally wooded, with an average width of 2 miles.

Hornby Island is much smaller. Over its western side rises rather abruptly a remarkable flat-top hill, *Mount Geoffrey*, 1,070 feet high; on its eastern side it falls gradually, and terminates in a low, bare grassy point. The eastern side is indented by *Tribune Bay*, affording good anchorage. On both these islands there is a considerable quantity of good land, particularly on the latter, also fresh water; and from the nature of the formation, it is probable that coal seams will be found to exist.

Denman Island is separated from the main by a good passage called Baynes Sound, and Hornby Island from Denman by Lambert Channel.

Yellow Island is small and bare, 80 feet high, and generally of a yellow colour. It lies close off the S.E. point of Denman Island, is remarkable, may be seen for several miles, and is a good object to steer for coming from the eastward, as it forms the eastern entrance point of the sound. *Maple Point*, which forms the western, is also very remarkable; it lies S.W. by W. $1\frac{1}{2}$ mile from Yellow Island, and is low and covered with maples.

BAYNES SOUND, separating Denman Island from the main, is a long narrow sheet of water, with an average navigable width something over half a mile, and with a general depth of 20 to 26 fathoms, so that vessels may, if necessary, drop an anchor in any part; there are, however, two very fair anchorages, *Fanny Bay* on the South or main side, and *Henry Bay*

on the North or island side. At the distance of 14 miles from the eastern entrance of the sound is *Port Augusta*, into which flows the Courtenay River, one of the largest streams in Vancouver Island, and in this immediate neighbourhood is a large extent of good clear grass land.

The exit into the Strait of Georgia by the N.W. entrance of the sound, between the North end of Denman Island and Cape Lazo, is nearly 2 miles in width, but a remarkable bridge or bar of sand, strewn with large stones, extends the whole way across, and at low water there is as little as 12 feet on it (page 395). During summer it is thickly covered with kelp, which never altogether disappears. The bar is very narrow, and is always smooth. Towards high water vessels of 19 feet draught may safely pass either into or out of the strait by this channel.

A sand-spit, which dries at low water, and is rather steep-to, extends one-third of a mile from Maple Point.

Deep Bay.—Maple Point, from the extremity of the trees, turns sharp off at a right angle to the W.S.W. for half a mile, and forms a low sandy spit, in shape resembling the long beak of a bird; within this is Deep Bay, in which the depth varies from 15 to 20 fathoms, irregular bottom, but sandy. It is a small, and not very desirable anchorage.

Fanny Bay, on the southern side of the sound, 4 miles within Maple Point, affords a good though somewhat limited anchorage. Base Flat, the delta of a considerable stream, having its rise in the Beaufort range of mountains, forms its western point; and Ship Point, a bold wooded bluff, its eastern. Entering from the eastward, give Ship Point, and the coast of the peninsula immediately eastward of it, a berth of a quarter of a mile, and anchor in 12 or 13 fathoms in the middle of the bay.

Village Point, on Denman Island, with a large native settlement on it, is remarkable; it is 2 miles N.W. of Fanny Bay, and a sand-spit extends a short distance off it.

Henry Bay.—Denman Island, towards its N.W. end, falls away into a remarkable wedge shape, terminating in a singular sharp beak-shaped extreme, called *Beak Point*; the hollow of this beak, on the N.W. side of the island, forms Henry Bay, which is nearly 6 miles from Fanny Bay, and is a safe and convenient anchorage, though, like the latter, it is somewhat limited in size.

From Beak Point a series of sand-banks, some of them above water, others covered, extend in a N.N.W. direction for a little more than 2 miles. *Sandy Island*, the largest of them, is two-thirds of a mile from the point, and 6 feet above high water, with large boulder stones dispersed over it; there is a good boat passage through at half tide. North-west of Sandy Island, and the same distance, is *White Spit*, which almost covers, and is very remarkable from the number of clam shells collected on it, giving it an ap-

pearance of a white sandy beach; it is also connected with Sandy Island at very low tides.

Kelp Bar.—The end of the shoal, which occasionally dries in patches, extends two-thirds of a mile N.W. of White Spit, and from it commences the remarkable kelp bar or bridge before mentioned (page 394), which connects Denman Island with the land about Cape Lazo, distant nearly 2 miles. The bar is composed of sand, interspersed with large boulders, which can be seen at low water. Great quantities of kelp grow on it during summer, and it is rarely entirely without it. To cross the kelp bar over its narrowest part and in the deepest water, a vessel should stand $2\frac{1}{2}$ miles through the sound, north-westward of Henry Bay, until a rather remarkable white beach (on the western shore, West 3 miles from Beak Point) is brought to bear S. by W. $\frac{1}{2}$ W., then steer out boldly N. by E. $\frac{1}{2}$ E.

Port Augusta, in the N.W. corner of Baynes Sound, although apparently a large sheet of water, its upper part is a mud flat, which almost dries at low tides, and is formed by the Courtenay River, which flows into it. From White Bluff, before mentioned, a remarkable elbow-shaped tongue of land named *Goose Spit*, projects to the southward and westward; it is grassy, with one or two hillocks, and bare. Goose Spit forms the northern entrance point of the port, and Grassy Point the southern; the latter is very low and swampy, the delta of a considerable stream. Off it, at low water, sand and boulders dry for 2 cables, and the water shoals suddenly from 10 to 1 fathoms at the distance of $3\frac{1}{2}$ cables, leaving a width of less than a mile between the entrance points.

Within Goose Spit is an excellent place with a S.E. gale, though no sea to speak of could get up in any part of Port Augusta.

Courtenay River is a deep and rapid mountain stream, but on account of falls and other obstructions is only navigable for a few miles for boats and canoes; it has its rise in Mount Washington, having a considerable extent of rich grass country on either side.

Mount Washington is remarkable, and rises to 5,400 feet; it is the westernmost of a range 10 miles in length, terminating in *Mount Becher* to the East; to the southward and westward of it are several high mountain ranges and peaks from 4,000 to 7,000 feet above the sea, the highest summits being covered with snow all the year round.

The *Beaufort Range* rise on the western side of Baynes Sound, 7 or 8 miles from the coast, and stretch for 12 miles in a W.N.W. and E.S.E. direction, varying in elevation from 4,500 to 5,400 feet; they are very remarkable, presenting 7 or 8 distinct summits, which are rarely free from snow. This range, together with Mount Washington, form the eastern boundary of the great central valley and chain of lakes which run through the length of Vancouver Island from the head of Barclay Sound.

Lambert Channel, between Denman and Hornby Islands, is a safe

passage running 6 miles in a W.N.W. and N.W. direction. It is a mile wide at its southern entrance, gradually increasing to the N.W. as it opens into the Strait of Georgia. The general depth of water is from 25 to 30 fathoms, shoaling to 16 fathoms on either side within 2 cables of the shore. Coming from the southward, Yellow Island marks the western entrance point, while Mount Geoffrey, a remarkable flat-top hill, 1,070 feet high, on Hornby Island, rises over the eastern side of the channel; either of these may be steered for until approaching the entrance, when W.N.W. is a mid-channel course through.

On the eastern side is *Norris Rock*, of considerable extent at low tide, but at high tide, a mere patch 5 or 6 feet above water; it lies N.E. $\frac{1}{2}$ N. $1\frac{1}{2}$ mile from Yellow Island.

The eastern side of Lambert Channel, between Norman Point and Shingle Spit, a distance of 2 miles, has two groups of covering rocks, extending nearly 2 cables off, and the shore should not be approached within a quarter of a mile. *Shingle Spit* is a remarkable low point on the eastern side of the channel, 2 miles within Norman Point.

Off the North end of Hornby Island stands a remarkable boulder rock, 7 or 8 feet high, with smaller ones near it, and vessels should not approach the shore in this neighbourhood within a long half a mile, at which distance are 7 to 10 fathoms.

Tribune Bay, on the S.E. side of Hornby Island, affords good anchorage with all but easterly or south-easterly winds, to which it is quite open. It is easy to enter or to leave, and conveniently situated as a stopping-place for vessels bound either way, being 35 miles West of Nanaimo, and 40 eastward of Cape Mudge and the entrance of Discovery Channel.

The eastern end of Hornby Island terminates in a rather remarkable point, called *St. John*, grassy, and bare of trees. Off it, in a S.S.E. direction, are 2 or 3 small low islets. Some reefs which generally break extend nearly half a mile outside the islets; these should be given a berth, and it is not recommended to pass nearer than half a mile to the N.E. of the Coast of Hornby Island.

The outermost of the dangers off the West point of Tribune Bay, is a 1-fathom rocky patch, called the *Nash Bank*, which must be carefully avoided. It is a quarter of a mile in extent, and lies N.E. by E. nearly a mile from Point Downes, the western entrance point, and S.W. by S. from the largest and outermost of the low islets off Point St. John. With a leading wind it is recommended to pass the eastern side of the bay within a short half a mile, and to steer up for the white sandy beach as soon as it is open, anchoring with the eastern bluff of the bay bearing E. by N. $\frac{1}{2}$ N., 3 or 4 cables from the eastern shore, in 2 fathoms, sandy bottom. There is anchorage, if desired, in 4 fathoms, much closer in.

CAPE LAZO will be seen after passing the eastern end of Hornby Island,

from which it bears W.N.W., distant 15 miles. It is a remarkable salient point about 250 feet high, flat and grassy on its summit, but wooded behind, and falling abruptly to the sea in yellow clay cliffs. Although a bold-looking headland, shoal water extends a considerable distance off, and it is recommended not to approach its eastern and south-east sides nearer than 2 miles, as only $4\frac{1}{2}$ fathoms, uneven bottom, is found at the distance of $1\frac{1}{2}$ mile.

Mittlenatch Island, at 16 miles N.W. of Cape Lazo, is half a mile in extent, 200 feet high, bare and peaked. Between it and the Vancouver Island shore, distant nearly 6 miles, is the fair channel to Cape Mudge and Discovery Channel.

Oyster Bay.—From Cape Lazo the coast trends W.N.W., is moderately high, and slightly indented with boulder beaches, which makes boat landing attended with danger unless in very calm weather. At the distance of 15 miles is Kuhushan Point, the southern extreme of a large but not very deep indentation, named Oyster Bay; *Shelter Point*, nearly 4 miles W.N.W. from Kuhushan, is its northern extreme. There is fair anchorage in 10 or 12 fathoms in this bay for vessels waiting wind or tide. A reef extends half a mile eastward of Shelter Point; 4 miles north-westward of Oyster Bay is the entrance to Discovery Passage.

CAPE MUDGE is one of those peculiar headlands so frequently met with on this coast, and resembles Point Roberts and Cape Lazo, except that the yellow clay cliff which forms its face is more covered with vegetation. The cape is between 200 and 300 feet high, flat, and wooded on its summit, falling to the westward as it enters Discovery Passage with a low boulder point. The high land of Valdes Island appears behind it from the south-eastward. A boulder beach extends in a semi-circular form from it to the eastward, and at the distance of 2 miles in this direction the depth is not more than 5 fathoms. The western low part of Cape Mudge should not be brought westward of W.N.W. in entering or leaving Discovery Passage.

DIRECTIONS.—The southern shore of the Strait of Georgia, with its anchorages and smaller channels, having been now described, a few remarks will be offered on the navigation of the main strait.

From the coast of Gabriola Island abreast Nanaimo, to the opposite shore of the continent, about Burrard Inlet, the width of the strait is 14 miles, the navigation free from danger, and the strength of the tide between 1 and 2 knots an hour. Coming from the southward, *Mount Shepherd*, on the South end of Texhada Island, is a very remarkable object, and shows as a high solitary peaked island standing in the middle of the strait; it is 2,900 feet in elevation, and is plainly seen in clear weather more than 30 miles off.

Proceeding westward, the long and comparatively low island of Lasqueti rises above the horizon, its singular bare turret-shaped summit 1,000 feet

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high presenting an unmistakeable feature. The Ballinae, and smaller islands westward of them, will now soon be made out. When abreast the former, the width of the channel contracts to 4 miles between them and the small island of Sangster, off the S.E. end of Lasqueti; after which it opens out again to 7 miles, and the rather remarkable flat-topped Mount Geoffrey on the West end of Hornby Island will be plainly seen. The southern coast of Lasqueti is bold, with no dangers off it which are not seen, except Seal Rocks, which cover at half tide, and lie $1\frac{1}{4}$ mile West of Sangster Island; off its West end are the small groups of Flat and Bare Islands, but no hidden dangers. False Bay, which indents its West end, is exposed, and not recommended as an anchorage.

The Sisters Islets are the next remarkable objects; they are two small black rocks 10 feet above high water, S.W. by S. from the West point of Lasqueti, with a deep water channel over a mile wide between them and Flat Islands. When abreast the Sisters, the main strait turns to the N.N.W. between them and Hornby Island for 4 miles, and then resumes its original trend to the W.N.W. The distance between the Sisters and Point St. John, the low bare East point of Hornby Island, is 5 miles; the latter, with the small islets off it, should be given a berth of nearly a mile. The Sisters are bold on all sides, but should not be approached too close in calm or light winds, as the tide sets straight past them. Having passed Point St. John, the distance to the entrance of the Discovery Passage is 38 miles. The strait mountains a uniform width of 9 miles, until near Mittenatch Island, or for 30 miles, the only stopping places being Oyster Bay, already described, 4 miles from Cape Mudge, and Gillies Bay, on the West side of Texhada Island. The shore of Texhada Island is bold.

NORTHERN SHORE OF THE STRAIT OF GEORGIA.

HOWE SOUND was thus named by Vancouver after Admiral Earl Howe, and was called Brazo de Carmelo by Galiano and Valdes. It is immediately adjoining Burrard Inlet (page 384) on the North, and is an extensive though probably useless sheet of water, the general depth being very great, while there are but few anchorages. It is almost entirely hemmed in by rugged and precipitous mountains rising abruptly from the water's edge to elevations of from 4,000 to 6,000 feet. There is no available land for the settler, and although a river of considerable size, the *Squawmisht*, navigable for boats, falls into its head, it leads by no useful or even practicable route into the interior of the country.

The entrance is between Atkinson Point, the North point of Burrard Inlet, and Gower Point, nearly 12 miles apart. The sound penetrates the continent in a northerly direction for 20 miles, and although of such considerable width for nearly 12 miles of its length, yet it is choked by some large and numerous smaller islands, between which are several ship passages. Bowen Island, the largest and easternmost, is remarkable, its highest summit rising to nearly 2,500 feet, being round, smooth, and partially bare, unmistakably pointing out the entrance from any direction; the island is 7 miles in length in a northerly direction, and more than 3 in width.

Queen Charlotte Channel, the easternmost passage into Howe Sound, is between Bowen Island and Atkinson Point; Passage Island, half a mile long only, but very prominent from the southward, stands in the centre of the channel, and on either side of it is a deep water passage. A tide ripple is frequently met with off Atkinson Point, caused by the meeting of the ebb streams from the sound and Burrard Inlet.

Snug Cove.—Northward of Passage Island $1\frac{1}{2}$ mile, and on the eastern shore, is White Cliff Point, and opposite, on the Bowen Island shore, distant $1\frac{1}{2}$ mile, is a double-headed cove. Snug Cove, the southernmost of these, though narrow, affords excellent anchorage to small craft in 9 fathoms, sheltered from all winds; *Deep Cove*, the northernmost, is larger, but with a S.E. wind, when anchorage would be most required, a swell would set in.

Vessels bound to Port Graves, which is the principal anchorage in the sound, should pass westward of Bowyer Island between it and Hood Point, the North point of Bowen Island. The latter is a rather remarkable low flat peninsula point, with a small high cliffy island lying off it.

Bound up the sound by Queen Charlotte Channel, a N.N.W. course leads mid-channel; pass eastward of White Rock, Centre Island, and Anvil Island, through Montague Channel. *White Rock* is a small but remarkable islet, 30 feet high. *Anvil Island* is oval-shaped, and 3 miles long, and its summit, Leading Peak, 2,746 feet high and very remarkable, resembles the horn of an anvil pointed upwards. From almost all parts of the strait of Georgia, this peak appears as a most prominent object; it is an excellent leading mark to clear the shoals off the Fraser River by being kept just open westward of Passage Island, on a N. by W. $\frac{3}{4}$ W. bearing.

Montague Channel, 5 miles above Bowyer Island, and between Anvil Island and the eastern shore, is a mile wide, and over 100 fathoms in depth, trending first to N. by W. for 7 miles, when it runs to the eastward for a further distance of 4 miles, terminating in a low delta, through which flows the *Squamish River*. The sound carries its depth to the head and shoals from 100 fathoms suddenly to 2 fathoms.

Collingwood Channel, to the westward of Bowen Island, between it and the group of smaller islands which stud the centre of the sound, is the most

direct route to Port Graves. In entering both shores are steep and bold; the direction of the channel for 4 miles is North, its width about a mile, and the general depth varies from 50 to 100 fathoms. The small islands forming the western side have no dangers but what are visible, except *Passage Rock*, which lies almost midway between Worcombe and Pasley Islands, and covers at half tide.

Bardieur Passage lies to the westward of the central group of small islands, between them and Keats Island. It is a safe ship channel, but not quite so wide as the one last described. A rock, which breaks at low water, extends $1\frac{1}{2}$ cable into the channel westward from the second of the islands in the entrance. The passages between the small islands are not recommended to be used unless by coasting vessels.

Shoal Channel, the westernmost entrance to Howe Sound, is between Keats Island and the mainland of Gower Point. It is convenient for vessels coming from the westward, and leads to Plumper Cove, a snug anchorage on the N.W. side of Keats Island.

The South point of Keats Island, which forms the eastern point of entrance to the channel, has a small but prominent and thickly wooded island lying close off it, Home Island. From a little within this island a bar of sand and shingle extends quite across the channel to the steep cliffs of the mainland; the greatest depth over it, at low water is 15 feet, and that in the centre of the passage, which is here half a mile in width. The width of the bar in the centre is not over a quarter of a mile.

Plumper Cove.—Immediately after crossing the bar of Shoal Channel, the water deepens to 20 fathoms, and two small islets, partially wooded, and almost joined at low water, will be seen N.N.E. a mile off; between them and the shore of Keats Island is Plumper Cove, which is perfectly secure with all winds, and however hard it may be blowing outside, it is generally a calm here.

Thornborough Channel is a continuation of the one just described, and leads up the western side of the sound, between Gambier Island and the main. Its direction after passing Plumper Cove is N.N.W., and at the distance of 6 miles is *Woolridge Island*, rather on the eastern shore; the wider channel lies westward of this island, but there is over 100 fathoms of water through Latona Passage to the eastward of it. Passing Woolridge Island, the arm turns to the north-eastward, and northward of Anvil Island leads to the head of the sound.

Gambier Island, lying in the centre of the sound, immediately northward of Bowen Island, is almost square shaped, and 6 miles in extent either way. On its western side rise two very remarkable cone-shaped mountains, over 3,000 feet in elevation; the southern face of the island is indented by three very deep bays or inlets, in the easternmost of which only is convenient anchorage found. *Port Graves*, the easternmost of the three bays on the South

side of Gambier Island, is the principal anchorage in Howe Sound. It is about 8 miles from the entrance, and may be reached with great facility by either of the channels already described; its entrance will not, however, be very apparent to a stranger, until closing Hope point, which forms its eastern side.

The Coast from Gower point, the western entrance of Howe Sound, trends W. $\frac{1}{2}$ S. for 18 miles to the entrance of Malaspina Strait, and is free from danger. *White Islet*, a bare rock, 50 feet high, lies $1\frac{1}{2}$ mile from the shore, 6 miles westward of Gower point, and is remarkable, always showing very white; there is deep water close to it and inside it. At 4 miles N.W. of this islet the coast recedes and forms Trail Bay. There is a very marked drop in the land at the head of this bay, across which, by a portage of 1,100 yards, the natives carry their canoes into Seechelt Arm, one of the many arms of Jervis Inlet. The Trail Islets, four in number, lie something more than half a mile off the western end of this bay.

Thormanby Islands, two in number, almost joined, and upwards of 2 miles in extent, are 18 miles from Gower point, and form the S.E. entrance point of Malaspina Strait.

TEXHADA or Favida Island, lying parallel with and on the eastern side of the Strait of Georgia, is 27 miles in length, with an average width of scarcely 4 miles. Throughout its whole length stretches a ridge of rugged trap mountains, wooded generally to their summits. At the southern end, *Mount Shepherd* reaches a height of 2,900 feet. Towards the northern end, the range decreases in elevation, but there is scarcely an acre of cultivable land throughout the island. Its shores are steep and bold on all sides, and the land rises abruptly, except at the North extreme.

The only anchorage, and that merely a stopping place, is Gilles bay, on the S.W. side (page 398).

LASQUETI ISLAND lies parallel with Texhada, at its S.E. end, and is separated from it by a channel about a mile in width. Its length is 9 miles, its average width something more than 2 miles, and it is remarkable from a singular turret-shaped summit 1,000 feet high, called *Mount Tremeton*, rising nearly in its centre. On its southern side are several boat coves, and in Tucker Bay, on the northern, there is very fair anchorage, with some good land in the neighbourhood. *Sangster Island*, half a mile long, lies S.S.W. a mile from Young point, the eastern extreme of Lasqueti.

Jenkins Island lies 3 miles westward of Sangster, and close to the South shore of Lasqueti. The *Sea Egg Rocks*, always uncovered, lie 3 cables off its West end.

STEVENS PASSAGE, between the Sisters Islets and Lasqueti, is upwards of a mile wide, and perfectly safe and clear. *Flat Islands*, on its eastern side, should be given a berth of a quarter of a mile.

SABINE CHANNEL, between Texhada and Lasqueti Islands, is a good *North Pacific*.

ship passage 9 miles long, in nearly an East and West direction, with very deep water; its breadth at the western end is 3 miles, but several high conical islands lying off the N.E. side of Lasqueti contract the width at the eastern end, in some parts to three-quarters of a mile. There is also a narrow but deep channel, *Bull Passage*, to the southward of these islands, by keeping close along the Lasqueti shore. *Tucker Bay*, on the North side of Lasqueti, and equidistant from either end, is a very fair anchorage.

MALASPINA STRAIT is a wide navigable channel, separating Texhada Island from the mainland. Its general direction is W.N.W. for 30 miles, when it again enters the Strait of Georgia* between Marshall Point, the N.W. extreme of Texhada and Harwood Island; its southern entrance lies between Upwood Point, the S.E. extreme of Texhada, and the western of the Thormanby Islands, and is 4 miles in width.

Upwood Point is rugged and precipitous; stunted pines grow between the crevices of the bare trap rock, the land behind more thickly wooded. Almost immediately over it rises *Mount Dick*, a very remarkable hump-shaped hill, 1,100 feet high, and 3 miles within is Mount Shepherd, the highest summit of the island. A covering rock lies 2 cables off the point.

Thormanby Islands, before mentioned, lying close to the mainland, and appearing as part of it, terminate at their N.W. point in a steep clay cliff, off which, at low water, dries a boulder point. The Texhada shore is bold, and almost straight for its whole length, fronted by narrow shingle or boulder beaches.

JERVIS INLET† is one of the most considerable of those numerous and remarkable arms of the sea which indent the continent of America from the parallel of Fuca Strait as far as lat. 60° N. It extends by winding reaches in a northerly direction for more than 40 miles, while its width rarely exceeds 1½ mile, and in most places is even less.

Neither in a commercial point of view, as a refuge for shipping, or as a means of communication with the interior of the country, does it appear likely ever to occupy any very prominent place, as it is hemmed in on all

* It was in this part that Vancouver met, to his great surprise and mortification, with the two Spanish surveying vessels which had preceded him. These were the brig *Sutil*, under Don D. Galiano, and the schooner *Mexicana*, under Don C. Valdes, detached from the commission under Malaspina, from whom, however, he met with the most polite and friendly attention.

† Jervis Canal, or Inlet, named by Vancouver after Admiral Sir John Jervis, is the Brazo de Mazarredo of Galiano and Valdes. Commander R. C. Mayne, R.N., attached to the survey under Captain G. H. Richards, ran his way through the dense forest and thickets between the head of Jervis Inlet and Port Pemberton, on the Fraser River, in July, 1860, the details of which arduous journey are given in his interesting work, Chapter IX. It was thought that this might be a good route on the coast to the upper part of the Fraser, but this journey dispelled such a notion.

sides by mountains of the most rugged and stupendous character, rising from its almost perpendicular shores to five, six, and sometimes eight thousand feet. The hardy pine, which flourishes where no other tree can find soil to sustain life, holds but a feeble and uncertain tenure here; and it is not uncommon to see whole mountain sides denuded by the blasts of winter, or the still more certain destruction of the avalanche which accompanies the thaw of summer. Strikingly grand and magnificent, there is a solemnity in the silence and utter desolation which prevail here during the months of winter, not a native, nor a living creature to disturb the solitude, and though in summer a few miserable Indians may occasionally be met with, and the reverberating echo of a hundred cataracts disturb the silence, yet the desolation remains, and seems inseparable from a scene which nature never intended as the abode of man. The depths below almost rival the height of the mountain summits; bottom is rarely reached under 200 fathoms, even close to the shore, and frequently at much greater depths; there are a few spots where vessels may drop an anchor, but they are either open and exposed, with an inconvenient depth of water, or from the narrowness of their entrance are only adapted to steamers or coasting vessels.

In the Vancouver Island Pilot, the various channels and shores are described at length, but as there appears to be but little to interest general commerce in this remarkable fiord, we shall make but brief extracts therefrom.

The entrance of the inlet is between Francis Point and Scotch Fir Point, which are 12 miles apart in a W.N.W. direction. Nelson Island lies immediately in the centre, and divides it into two channels, the westernmost being the principal one.

Agamemnon Channel, the eastern entrance to the inlet, is 9 miles N. by W. from Point Upwood. After running between Nelson Island and the main in a general northerly direction for 9 miles, it joins the main channel of the inlet. Its average width is little more than half a mile, the tides run from 1 to 3 knots, the depth of water varies from 50 to 100 fathoms, and it affords no anchorage. There are three passages into Agamemnon Channel. The middle, between Channel Islets and Pearson Island, and the easternmost between the latter and Martin Island. The passages are about the same width, something over a quarter of a mile, and have deep water. Vessels entering by the western passage, or coming from the westward along the shore of Nelson Island, must avoid the *Nile Rock*, which covers at quarter flood, at a mile S.W. by W. from Fearney Point, the S.E. point of Nelson Island, and the same distance West from the largest Channel islet.

Pender Harbour is the only anchorage deserving the name, with a moderate depth of water, to be found in the neighbourhood of Jervis Inlet, and its entrance is so encumbered by islands as to render it difficult of access to anything but steam or coasting vessels; it immediately adjoins

the Agamemnon Channel on the South, and lies E.N.E. three-quarters of a mile from Pearson Island, indenting the coast for 3 miles in the same direction.

The Western Entrance of Jervis Inlet is between Alexander Point, the South extreme of Hardy Island, on the East, and Scotch Fir Point on the West. The points are not remarkable, but the opening is readily made out. It is nearly 2 miles in width, and takes for a short distance a N.N.W. direction. Scotch Fir Point is rocky, and has two small islets lying close to the westward of it, which, like the point itself, are covered with stunted pines. *Thunder Bay*, formed on the western side, $1\frac{1}{2}$ mile above Scotch Fir Point, is one of the few spots in Jervis Inlet where a vessel may drop an anchor, and, being near the entrance, is likely to prove convenient.

Nelson Island, in the middle of the entrance to Jervis Inlet, is 10 miles long in a northerly direction, and about 4 or 5 miles wide. The island is mountainous, the summits ranging from 500 to 1,000 feet in height. Cape Cockburn, its S.W. point, is of white granite, about 80 or 90 feet high. A rock lies 1 cable South of it.

Prince of Wales Reach.—Dark Cove, which affords a snug anchorage on the West side of Jervis Inlet, within the Sydney Islets, is 2 miles North of Captain Island, and 12 miles from the entrance. *Vancouver Bay*, on the East side of the inlet, 19 miles from the entrance, is about half a mile in extent, and of square shape.

Princess Royal Reach.—*Deserted Bay*, also on the East side of the inlet, at the termination of Princess Royal Reach, and about 37 miles from the entrance, is small, and affords an indifferent anchorage in its eastern part. A valley extends from the head of the bay to the N.E., through which a trail runs to the Lillooet Lakes on the Fraser River, and is much frequented by the natives in the summer season.

Queen's Reach.—The head of Jervis Inlet terminates in a patch of low swampy land, through which flow some small streams; it does not afford any anchorage, there being 25 fathoms within half a cable of the outer edge of the bank. A remarkable peak, *Mount Victoria*, rises 2 miles North of the water's edge to a height of 7,452 feet, and is a very conspicuous object on approaching the head of the inlet. *Princess Louisa Inlet*, on the East side of Jervis Inlet, 5 miles below the head, is narrow, and about 4 miles long in an E.N.E. direction.

Seechelt Arm, the entrance to which is on the East side of Jervis Inlet, 1 mile North of Agamemnon Channel, is an extensive arm of the sea, penetrating the land for 17 miles in a south-easterly direction towards the Strait of Georgia, and only separated from the latter by a low neck of land 1,100 yards wide, forming an extensive mountainous peninsula to the westward, called Seechelt Peninsula.

Tides.—It is high water, at full and change, in Jervis Inlet at 6 hours.

the rise and fall being about 14 feet; within the Seechelt arm the rise and fall seldom exceeds 6 or 7 feet.

Harwood Island, off the West entrance to Malaspina Strait, $1\frac{1}{2}$ mile from the continental shore, and about 3 miles N.W. of Point Marshall, is $2\frac{1}{2}$ miles long in a northerly direction, and $1\frac{1}{2}$ mile wide, from 150 to 200 feet high, flat, and thickly wooded. There is deep water between the island and the shore.

The COAST.—Westward of Jarvis Inlet, the North shore of Malaspina Strait runs in a westerly direction for 11 miles, terminating at *Grief Point*. For a considerable distance inland it is low, and bordered by a sandy beach. There are no off-lying dangers that are not seen.

From Grief Point the North or continental shore of the Strait of Georgia runs in a W.N.W. direction for nearly 20 miles almost straight to *Sarah Point*, the S.E. entrance point of Desolation Sound.

Savary Island, nearly 6 miles W.N.W. of Harwood Island and 1 mile from the continental shore, is 4 miles long in a W.S.W. direction, but narrow. A sandy beach, strewn with huge boulders, surrounds it, and extends a considerable distance off its North and West sides, which should not be approached nearer than half a mile. The height of the island varies from 80 to 120 feet, and the South side is faced by some remarkable white sandy cliffs, very conspicuous from the S.E. Its East extreme is a granite cliff, steep-to. A sandy bar or ledge, of 1 to 2 fathoms water, extends from its West point to *Hernando Island*. *Hurtado Point*, on the main abreast Savary Island, is about 250 feet high, bold and cliffy.

Mystery Rock, apparently a short distance to the eastward of Savary Island, is of small extent, and uncovers at low water. Uncertainty exists as to its exact position, but during the survey the rock was twice seen by Mr. Bedwell in 1862 from the South point of Harwood Island, though not from anywhere else. Vessels, therefore, in navigating this locality should observe great caution when going between Savary and Harwood Islands, but by keeping within half a mile of the continental shore this danger will be avoided.

Ragged Islands, close to the continental shore, and running parallel to it, are a rocky group of small islands $2\frac{1}{2}$ miles long; their S.E. part is about $2\frac{1}{2}$ miles N.W. of *Hurtado Point*, and some rocks extend 4 cables from their N.W. extreme. *White Islet*, a mile to the S.W. of them, is a very remarkable bare white granite rock, about 70 feet high. A rock, which uncovers at low water, lies 1 cable East of it.

Sarah Point, at 20 miles W.N.W. of Malaspina Strait, may be called the N.W. entrance point of the Strait of Georgia. It is a rounding rocky point, sloping gradually to the sea from a height of about 700 feet, at a short distance within it. The coast here turns sharply round to the eastward into Malaspina Inlet.

Hernando Island, 2 miles West of Savary, and 3 miles N.N.E. of Mittenatch Island (page 397), is about 2 miles in extent, flat, thickly wooded, and from 120 to 170 feet high. A ledge, composed of sand and huge boulders, extends two-thirds of a mile from its S.E. point. *Stag Bay*, on the North side of Hernando, affords anchorage, and is useful as a stopping-place for vessels bound to Bute Inlet or Desolation Sound.

Baker Passage, to the northward of Hernando Island, and leading from the Strait of Georgia to the entrance of Desolation Sound, is about 5 miles long in a north-easterly direction, and 1 mile wide in the narrowest part, being bounded on the North side by Cortes and Twins Islands. The only danger is at its N.W. entrance point, off which a boulder ledge extends upwards of 3 cables in a south-easterly direction. The *Centre Rock*, which covers at a quarter flood, is in the middle of the passage between the Twins Islands and Cortes.

Blind Creek, on the East side of Cortes Island, $1\frac{1}{2}$ mile North of Twins Island, is a basin of about 4 cables in extent, but useless as an anchorage.

LEWIS CHANNEL, off the entrances to Desolation Sound, between Cortes and Redonda Islands, to the westward of the latter, runs nearly straight upwards of 12 miles in a north-westerly direction, and varies in breadth from 1 mile to 3 cables, widest at the S.E. part; its shores are generally rocky, low in the South part, but rising gradually to the N.W., steep-to, and everywhere free from danger; no directions are necessary for navigating it.

Squirrel Cove, on the West side of Lewis Channel, $4\frac{1}{2}$ miles from Turn Point, the S.W. entrance point, is a small land-locked basin of 6 to 7 fathoms water, with room for a vessel of considerable size to lie at single anchor. It is entered by a narrow passage about 130 feet wide. Squirrel Cove can only be entered by steamers or sailing vessels with a fair wind, and the chart is the best guide. There are no dangers whatever within or near it.

Northward of Squirrel Cove the West side of Lewis Channel becomes more rocky, and gradually increases in height; it takes a northerly direction for a mile to Junction Point, and then trends to the N.W. for 7 miles, the channel ending at Bullock Bluff, the North extreme of Cortes Island.

Kinghorn Island, in the South entrance to Desolation Sound, and forming the S.E. point of entrance to Lewis Channel, is about 2 miles in circumference, and from 400 to 500 feet high; it is clifty, and steep-to on the S.W. or channel side.

SUTIL CHANNEL.—This extensive channel, which leads from the western part of the Strait of Georgia to the entrances of Toba and Bute Inlets, is bounded on the East side by Cortes, and on the West by Valdes and Read Islands. Its length in a northerly direction is 15 miles; and the breadth at its entrance to the Strait of Georgia 6 miles, decreasing to one mile in the northern part. The soundings in mid-channel are deep, though

there are several dangers off both shores near the southern parts, but northward of Mary Island it is quite clear.

There are several good anchorages on either side, two of which, Drew Harbour and Carrington Bay, are easy of access to all vessels, and useful as stopping-places.

The tides in the Sutil Channel are weak, seldom exceeding 2 knots. The flood stream runs to the northward from the Strait of Georgia. It is high water, at full and change, at 6 hours, and the rise and fall is 12 feet.

CORTES ISLAND.—The West side of this island, which forms the eastern boundary of Sutil Channel, is generally low, and indented by several bays and creeks, in many of which good anchorage may be found. Off Reef Point, its South extreme, a ledge, composed of sand and boulders, extends three-quarters of a mile, and covers at three-quarters flood.

Gorge Harbour, the entrance to which is on the West side of Cortes Island, $4\frac{1}{2}$ miles N.N.W. from Reef Point, is 2 miles long in a westerly direction, and 1 mile broad at the widest part, affording good anchorage in 9 to 12 fathoms. The entrance to it is through a narrow gorge nearly half a mile long, bounded on either side by steep cliffs about 200 feet high, and less than 40 yards wide in some places, with 6 fathoms in the shoalest part. The tide runs through it from 3 to 4 knots. The best and most convenient anchorage is in the West part, about half a mile from the entrance.

In entering Gorge Harbour, which can only be done with a favourable tide, unless in a steamer, after passing Guide Islets, steer boldly up the gorge or entrance, and take care, on nearing its North part, to pass between Tide Islet and the West shore, the passage East of the islet being shoal, when haul to the N.W., pass on either side of the Bee Islets, and anchor in from 10 to 12 fathoms, muddy bottom, 1 or 2 cables to the westward of them.

Mary Island, on the East side of Sutil Channel, about 3 miles N.W. by W. $\frac{1}{2}$ W. from Reef Point, is of a round shape, about 6 miles in circumference, and from 70 to 150 feet high; extending upwards of a mile in a S.S.E. direction off its South point is a ledge about 2 cables wide, called the Boulder Reef, which covers at high water. **Camp Island**, off the West extreme of Cortes Island, and 7 miles from Reef Point, is of small extent, and wooded; between it and Cortes Island is Plunger Pass, about 3 cables wide, deep, and clear of danger.

Carrington Bay, on the N.W. side of Cortes, about 3 miles from Centre Islet, is a mile deep in an easterly direction, about 3 cables wide, and affords anchorage at a distance of 3 cables from its head. **Von Donop Creek**, the entrance of which is $5\frac{1}{2}$ miles from Centre Islet, is long and narrow, penetrating Cortes Island in a south-easterly direction for upwards of 3 miles. There is good anchorage in 5 to 6 fathoms near its head, but the entrance

being only 30 yards wide in some places, a vessel should not use it as a stopping-place.

VALDES ISLAND.—Cape Mudge, the South extreme of Valdes Island, and the S.W. entrance point of Sutil Channel, has been described in p. 397. A bank extends in a south-easterly direction for some distance from the cape, and until well inside the channel the cape ought not to be approached within 2 miles. The coast of Valdes turns sharply round the cape to the N.N.W., running in a straight direction for $3\frac{1}{2}$ miles.

Drew Harbour, on the East side of Valdes, 6 miles from Cape Mudge, is about 1 mile deep, 3 to 4 cables wide, and rendered perfectly secure, and locked by a narrow strip of land called *Rebecca Spit*, which forms its eastern boundary. The anchorage, in 9 to 15 fathoms, sandy bottom, at a distance of half a mile from its head, is the best in Sutil Channel; its shores are low, and bordered by a sandy beach.

Hyacinthe Bay, on Valdes Island, and $1\frac{1}{2}$ mile N.W. of Drew Harbour, is of small extent, with from 16 to 20 fathoms water, but affords no anchorage. *Open Bay* is half a mile North of Hyacinthe Bay, and separated from it by a rocky point. A vessel should not anchor there.

Hoskyn Inlet, formed between Read and Valdes Islands, on the East side of the latter, is 7 miles long in a northerly direction, with an average breadth of two-thirds of a mile. The shores are broken and rocky, with some small islands off the South entrance and along the East side, and there is no anchorage within it, except for small craft.

READ ISLAND, bordering the West side of the N.W. part of Sutil Channel, is 9 miles long in a northerly direction, and from 1 to 3 miles broad. Its southern part is low, but rises gradually to the northward to 1,600 feet in some places. *Viner Point*, its South extreme, is bare, and about 40 feet above high water; it lies 7 miles North of Cape Mudge.

Burdwood Bay, on the East side of Read Island, 2 miles from Viner Point, is about a mile wide, 2 to 3 cables deep, and contains several small islets. There are 12 fathoms at a short distance off shore, in its North and South parts, where a vessel may stop in fine weather, but the bay is open to the South and East.

Evans Bay, the next inlet on the East side of Read Island, to the northward of Burdwood Bay, is about 3 miles long in a northerly direction, $1\frac{1}{2}$ mile wide at the entrance, and branches off in two narrow arms near its head. Its shores are rocky and much broken, and there is no anchorage except in Bird Cove, on the West shore, where small craft may find shelter. *Frederick Point*, the N.E. point of entrance to the bay, is bold, and may be approached to 1 cable.

Hill Island, just outside the entrance of Evans Bay, is of small extent, but conspicuous from its centre, 490 feet high. The shores are rocky, and may be approached to a quarter of a mile.

Penn Islands, near the middle of the Sutil Channel, to the northward of Evans Bay, cover an extent about $1\frac{1}{2}$ mile long and 1 mile wide. They are rocky, covered with stunted trees, and their greatest elevation is about 270 feet. A vessel should not venture among them, but there is a clear passage on their East and West sides.

Directions.—Entering the Sutil Channel from the Strait of Georgia, pass within half a mile on either side of Mittlenatch Island, and steer N.W. by W. or N.W. $\frac{1}{2}$ W. for the entrance, taking care to keep the North side of Texhada Island open westward of Hernando and Savary Islands E. by S., until Camp Island opens West of Mary Island N.N.W., to clear the reefs extending off the South points of Cortes and Mary Islands (p. 407); when clear of the latter danger haul more to the northward, steering about N.N.W. or N.W. by N., and passing about a quarter of a mile westward of Centre Islet, steer up mid-channel, going, as most convenient, on either side of the Penn Islands.

A vessel may beat through this channel, but till past the dangers in the South part it would not be prudent to near the West sides of Cortes and Mary Islands within $1\frac{1}{2}$ mile in standing to the eastward; and in standing towards Cape Mudge do not approach it within 2 miles, or bring Mittlenatch to the eastward of E. by S. $\frac{1}{2}$ S., until the cape bears S.W., when a vessel may stand to half a mile of the Valdes shore. If intending to anchor, Drew Harbour and Carrington Bay are easy of access for any class of vessel, and but little out of the regular track.

Calm Channel, to the North of Lewis and Sutil Channels, leading from them to Bute Inlet, is 9 miles long in a N.W. by W. direction, and about 1 mile broad; its shores rise abruptly to a great height, are everywhere clear of danger, and the tides weak, except in the N.W. part. This channel is not well adapted for any vessels except steamers, as there is generally but little wind, and no anchorage. No directions are necessary for navigating it.

Stuart Island, at the northern termination of Calm Channel, and in the entrance of Bute Inlet, is about 4 miles in extent, of an undulating surface, rising in some parts to 800 and 1,000 feet. Its shores are rocky and clear of danger.

BUTE INLET.—This extensive arm of the sea, which penetrates the continent for nearly 40 miles in a winding course to the northward, presents many similar features to Jervis Inlet, the general breadth varying from 1 to 2 miles, and the shores on either side rising abruptly and almost precipitously, in many places to stupendous mountains from 5,000 to 8,000 feet high, whose summits are generally covered with snow all the year round. At the head are two extensive valleys, one penetrating to the N.W. and the other to the S.E., from which flow streams, the one to the westward, called by the natives *Homalko River*, is navigable for a long distance by boats and

stern-wheel steamers of light draught. Of these rivers some sand-banks extend a short distance, affording indifferent anchorage near their outer edges; but the soundings everywhere else in the inlet are very deep. The water for some distance from the head is nearly fresh, and of a milky white appearance. In the summer months there is a constant outset, varying in strength from 1 to 2 knots.

A direct route from the coast to the Cariboo country, by the way of Bute Inlet, was partially carried into effect in 1864, and a small wharf was erected at the mouth of the Homalko River. These solitary posts are very dangerous residences, and some frightful tragedies have occurred at them. The wholesale massacre of the white occupants has been more than once perpetrated by the bloodthirsty Indians.

Bute Inlet has more recently been proposed by A. Waddington, Esq.,* as a terminus of a railway and steam-boat route between the Atlantic and Pacific Oceans. F. Whympere, Esq., gives an interesting account of a visit to a great glacier at its head.

Arran Rapids, at the entrance of the inlet on the West side, between Stuart Island and the continent, are 2 cables wide in the narrowest part. The tides rush through with great strength, the flood from the westward; and it would be very hazardous for a vessel to go through them except at slack water.

Orford Bay, on the East side of the inlet, 19 miles from the entrance, is of small extent. A small vessel may use it as a stopping-place.

Waddington Harbour, at the head of the inlet, being in fact its termination, is about 2 miles in extent, and affords an indifferent anchorage off the edge of the banks, extending from the Homalko and Southgate Rivers, and off its East shore. Except in the vicinity of the rivers, the land rises almost precipitously to 4,000 and 5,000 feet, is most sterile and rocky, covered with stunted pines.

Homalko or Homathko River enters Waddington Harbour on the West side, and is a stream of considerable extent, winding to the N.W. through a large valley. At the entrance is a bar with only 1 to 2 feet over it at low tide, but within the water deepens to 1 and 3 fathoms. Homalko River and Waddington Harbour are likely to become places of some importance,

* Mr. Waddington spent five years in procuring information respecting his proposed inter-oceanic route. His plan is to form a railroad from the head of Bute Inlet, through the Cascade Range to the junction of the Quesselle River with the Fraser River, a distance of 222 miles. This country was quite unknown till thus explored by Mr. Waddington. From this point on the Fraser there is a direct route to the Cariboo country, and the Fraser is navigable, upwards, for steam-boats for 280 miles up to the Leather or Yellow Head Pass through the Rocky Mountains, from thence the route towards Canada by the Saskatchewan River, has been well surveyed. The details of this plan are given in the Journal of the Royal Geographical Society, 1868, vol. xxxviii. pp. 118—128.

as, from the sources of the former, an easy route has been discovered to the gold-mining regions in the far North of British Columbia.

In navigating Bute Inlet but few directions are required, as the points may be everywhere approached to half a cable, and, if intending to anchor in Waddington Harbour, when nearing it steer for its North port, anchoring about three-quarters of a mile off the head in 15 fathoms, and about 3 cables from the high northern shore. The anchor should be dropped immediately 15 fathoms are obtained, as the bottom shoals rapidly.

Tides.—It is high water, full and change, in Calm Channel at 7 hours, and the rise and fall is 14 feet. In Bute Inlet it is high water at 6 hours, and the rise and fall varies from 12 to 14 feet.

DISCOVERY PASSAGE, formed between the West side of Valdes Island and the Vancouver shore, is the only known navigable outlet from the North part of the Strait of Georgia to the N.W. Its length in a N.W. and S.E. direction from Cape Mudge to Chatham Point is $23\frac{1}{2}$ miles, and its average breadth a little more than 1 mile; but at Seymour Narrows it contracts to less than half a mile. Its shores, southward of the Narrows, are moderately high and apparently fertile, but northward of them steep, rugged, and mountainous.

Tides.—Southward of Seymour Narrows the stream runs with great strength, from 4 to 6 knots at springs, and turn at high and low water by the shore. At the southern entrance, near Cape Mudge and between it and Willow Point, heavy races or tide rips rage during the flood, which would be dangerous to small vessels in blowing weather. It is high water, full and change, at 5^h 30^m, and the rise and fall is about 11 feet.

Northward of Seymour Narrows the streams are comparatively slack; they run from $1\frac{1}{2}$ to $2\frac{1}{2}$ hours after high and low water. At the Narrows it is high water, full and change, at 4 hours, and the rise and fall is about 13 feet.

In Discovery Passage, when to the southward of Seymour Narrows, the soundings in mid-channel vary from 30 to 60 fathoms, except at 1 mile N.W. by W. from Cape Mudge, where a shoal patch of 8 fathoms exists. In Seymour Narrows the least water in mid-channel is 35 fathoms, but northward of them the depth increases to 100 and 140 fathoms.

Cape Mudge, with the bank off it to the south-east, have been already described in p. 397. From it the West side of Valdes Island takes a north-westerly direction, and at the distance of 3 miles is a small indentation named *Quathiasky Cove*, bordered by a sandy beach. The cove is only fit for steamers or small craft, and only affords room for one vessel to moor in its S.E. and another in its northern part. The land between Cape Mudge and Quathiasky Cove is about 100 feet high, flat, and fertile. An Indian village of considerable extent stands midway between the two places.

Gowlland Harbour, the next opening in Valdes Island, about 5 miles

N.W. of Cape Mudge, is of considerable extent, being upwards of $2\frac{1}{2}$ miles long in a N.W. and S.E. direction, and a quarter to two-thirds of a mile broad. The best berth, if stopping for a short time, is in 6 or 7 fathoms about 2 cables East of Vigilant Point, the N.W. extreme of Gowlland Island. In the South part of the harbour the water is deeper, and the anchorage more extended. Off the entrance is *Steep Island*, about 100 feet high, 4 cables long, N.W. and S.E., and 1 cable wide. *Gowlland Island* protects the harbour to the S.E. *Entrance Bank* lies nearly across the entrance to the harbour, and partly dries at low water. There is a clear passage on either side of it, with not less than 4 fathoms.

From Gowlland Harbour to Seymour Narrows the coast takes a W.N.W. direction, being steep-to, high, and rugged. *Maud Island*, the S.E. point of the Narrows, is small, and about 300 feet high.

Willow Point of Vancouver Island, the S.W. point of Discovery Passage, lies S. by W. nearly 2 miles from Cape Mudge. It is low, covered with willow bushes, and off it a sandstone ledge extends to the N.E. for nearly 3 cables. In passing the point do not approach within half a mile.

From Willow Point a low coast runs N.W. for 7 miles to *Orange Point*, and is bordered the whole distance by a sandy beach.

Duncan Bay, of which *Orange Point* is the East extreme, is about half a mile deep, and affords good anchorage in 14 to 7 fathoms, sand, well out of the tide, and sheltered from all except N.W. winds. This bay is easy of access, and the best anchorage southward of Seymour Narrows.

Menzies Bay, immediately S.W. of Seymour Narrows, is of considerable extent, running in a W.N.W. direction for $1\frac{1}{2}$ mile, and three-quarters of a mile broad, but in its centre is a large sand-bank, which partly dries at low water, with a narrow but clear passage on either side. Good well-sheltered anchorage in 5 to 6 fathoms may be procured between this bank and the head of the bay.

SEYMOUR NARROWS, at $10\frac{1}{2}$ miles N.W. by W. from Cape Mudge are about $1\frac{1}{2}$ mile long, from 3 to 5 cables wide, and the shores on both sides are high, rugged, and steep-to. A dangerous rock, with only $3\frac{1}{2}$ fathoms on it, was discovered in the Narrows after the survey had been published. It lies almost in the centre, but rather on the western side, between *Maud Island* and *Wilfred Point*, at 3 cables N.W. by W. $\frac{1}{2}$ W. from the N.W. point of the island, and near the heaviest of the tide-race. It is therefore dangerous during the strength of either stream, and should only be passed at slack water, keeping on the eastern shore. In consequence of the contraction in breadth of Discovery Passage the tide rushes through these Narrows with great velocity, nearly 9 knots at springs; the flood and ebb streams run for nearly equal intervals of 6 hours, a very short period of slack water intervening between them.

It is recommended to choose the early part of a favourable tide to pass

through these Narrows, for during the greatest strength a boiling race extends across, and steering becomes very difficult.

Northward of the Narrows, Discovery Passage takes a north-westerly direction for 12 miles to Chatham Point, the shores becoming more high and rugged than before. On the eastern shore are several bays or openings, but with the exception of Plumper Bay, too deep to afford anchorage. The western shore is nearly straight, and near Chatham Point are Otter Cove and Elk Bay, both affording anchorage.

Plumper Bay, half a mile North of Seymour Narrows, is about two-thirds of a mile deep, and the same in width, affording anchorage in from 14 to 19 fathoms, near its S.E. part, easy of access, well sheltered, and out of the tide. *Deep-water Bay*, separated from Plumper Bay by a peninsula, is about 1 mile deep, and half a mile broad, but too deep for anchorage.

Granite Point is a high white granite bluff on the western shore, at the northern termination of Seymour Narrows. At 2 cables N.W. from Granite Point is a rock with only 9 feet water.

Nodales Canal is an extensive opening running in a N.E. by E. direction between Thurlow and Valdes Islands; its western entrance, which is upward of a mile wide, with deep water, is $1\frac{1}{2}$ mile N.E. by N. from Chatham Point. There are some tide-rips off it.

Elk Bay, on the West side of Discovery Passage, at 9 miles N.W. of Seymour Narrows, is about $1\frac{1}{2}$ mile broad, and three-quarters of a mile deep. It affords indifferent anchorage, in 14 to 15 fathoms. A rock, which covers at half flood, lies $1\frac{1}{2}$ cable off the shore, three-quarters of a mile N.W. of Elk Bay. *Otter Cove*, on the West side of Discovery Passage, and just South of Chatham Point, is a small but snug anchorage, completely sheltered from all winds by *Limestone Island*, in the centre of the entrance.

CHATHAM POINT, nearly 24 miles from Cape Mudge, is the N.W. extreme of Discovery Passage, and also separates it from Johnstone Strait. It is a low rocky point, and at 2 cables N.E. from its North extreme is the *Beaver Rock*, awash at low water; in rounding, the shore ought not to be approached nearer than half a mile.

Directions.—In proceeding through Discovery Passage from the southward, if the tide be favourable, a vessel has only to keep in mid-channel till past Seymour Narrows; but if the tide be unfavourable, after passing Cape Mudge, keep about 2 or 3 cables off the eastern or Valdes Island shore, which is steep-to, and the tide does not run so strong. If unable to get through the Narrows, Menzies and Duncan Bays afford good anchorages. The latter ought to be preferred, being easier of access.

North of Seymour Narrows, the tides being comparatively weak, a vessel may proceed either in mid-channel or close to either shore, except in rounding Chatham Point, which should not be approached nearer than 4 or 5 cables, to clear the Beaver Rock. Plumper Bay affords a good stopping-

place to a vessel unable to proceed through Seymour Narrows from the northward.

Sailing vessels of any size ought not to attempt to beat through southward of the Seymour Narrows.

JOHNSTONE STRAIT, which separates the N.E. side of Vancouver Island from the main, is comprised between Chatham Point and Beaver Cove, being about 55 miles in length in a W. by N. and E. by S. direction, with a varying breadth of 1 to 2 miles. The shore on both sides is high and rugged, more especially the southern one, which may be said to be a continuous mountain range, rising almost abruptly from the sea, the summits of which vary from 2,000 to 5,000 feet in height, some of the higher ones being clad in snow all the year round.

The shores of the strait are nearly everywhere steep-to, except a few spots along the northern side, hereafter described.

From Chatham Point to the West end of Thurlow Island the soundings in mid-channel are very deep, no bottom in many places being found with 150 fathoms. West of Hardwicke Island it again deepens to no bottom at 150 and 170 fathoms.

Tides.—Everywhere in Johnstone Strait it is high water, full and change, at 0^h 30^m, and the rise and fall of tide is from 15 to 17 feet. The streams run from 2 to 2½ hours after high and low water by the shore, and except in the vicinity of Helmcken Island and to the eastward of Knox Bay, they are not strong. In the former place they run from 3 to 7 knots, and in the latter 2 to 4 knots; but in other parts of the strait they seldom exceed 1 to 3 knots per hour.

THURLOW ISLAND is on the North side of Johnstone Strait, to the westward of Nodales Canal; its South side, which borders the strait, is rocky, and about 13 miles long in a westerly direction; the eastern half is indented by several bays, off which lie some small islands.

Knox Bay, on the South side of Thurlow, and 7 miles westward of Chatham Point, is two-thirds of a mile deep and about the same in width, affording anchorage in from 15 to 17 fathoms 2 cables from the head. The anchorage is well protected from East or westerly winds, but it ought only to be used as a stopping-place for the night or tide.

Between Knox Bay and Nodales Canal lie the *Pender Islands*, which are very rugged and barren, the largest being 150 feet in height.

Westward of Knox Bay the coast of Thurlow Island is almost straight, running in a W.S.W. direction for nearly 6 miles, when it turns to the N.W. Its shores are high, rugged, and steep-to.

Ripple Point, on the South or Vancouver shore of the strait, 6 miles West from Chatham Point, is steep-to, and between it and Knox Bay are some heavy tide rips in blowing weather. *Ripple Shoal*.—Camp Point, 9½ miles

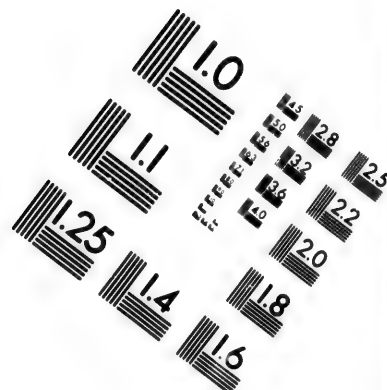
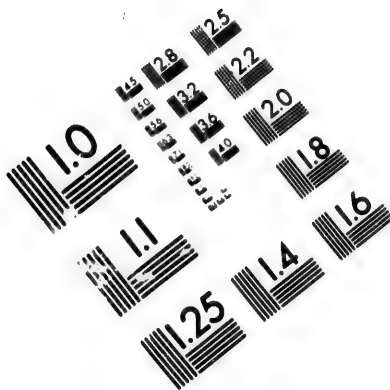
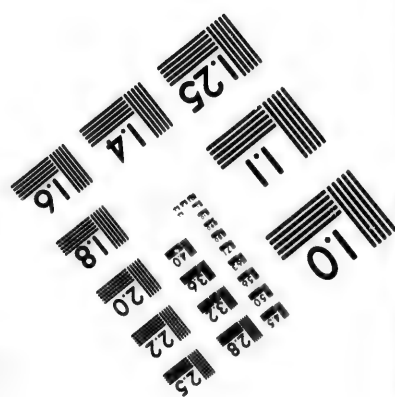
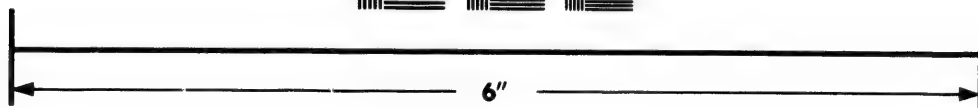
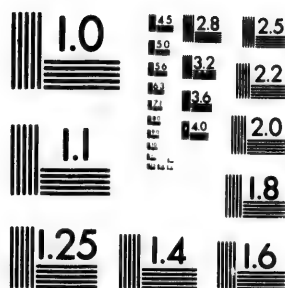


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W. by S. $\frac{1}{2}$ S. from Ripple Point, slopes gradually to the sea; and half a mile to the N.E. of it is the Ripple Shoal, with from 7 to 9 fathoms.

Salmon Bay.—The coast between Ripple and Camp Points runs in a W.S.W. direction, curving slightly inwards; and westward from Camp Point to Salmon Bay it is nearly straight for 4 $\frac{1}{2}$ miles. Salmon Bay at high water appears of considerable extent, but affords no anchorage.

Helmcken Island, lying 3 miles westward of Thurlow Island, in the centre of the strait, is 1 $\frac{1}{2}$ mile long East and West, and about half a mile wide, with a clear channel of the same width on either side of it. The island is about 150 or 200 feet high. The *Speaker Rock*, which covers at one-quarter flood, lies 2 $\frac{1}{2}$ cables N.E. from its eastern point, and is in the track of vessels using Current Passage. *Race Passage*, to the southward of Helmcken Island, is half a mile wide, but deep and clear of danger. The tide sets very strongly through it. This is the passage generally used.

Hardwicke Island forms the North side of Johnstone Strait for 7 miles to the westward of Thurlow Island, and is separated from the latter by *Chancellor Channel*. Near its S.W. extremity, where *Earl Ledge* runs off for 3 cables, it only uncovers at low water. Two islets lie off the West point of Hardwicke, and outside them the Fanny Reef, which covers or is awash at high water. *Blinkinsop Bay*, on the shore of British Columbia, 2 $\frac{1}{2}$ miles N.W. of Hardwicke Island, and 25 miles from Chatham Point, is about 1 $\frac{1}{2}$ mile deep, and half a mile wide. This bay affords good anchorage, in 10 to 12 fathoms, about one-third of a mile N.E. of its S.W. point, and is well sheltered and easy of access.

PORT NEVILLE, the next opening in British Columbia West of Blinkinsop Bay, is of considerable extent, running in a north-easterly direction for 7 miles, and varying from one-quarter to 1 mile in breadth. It affords a spacious and secure anchorage, but in consequence of the Channel Rock lying near the middle of its entrance channel, great caution is required in entering. In the shoalest part of the entrance channel there are not more than 2 $\frac{3}{4}$ or 3 fathoms, and in the middle of its North part, 3 $\frac{1}{2}$ cables S.W. $\frac{1}{2}$ S. from Boulder Point, is the *Channel Rock*, of small extent and very dangerous, having only 4 feet over it.

Robbers' Nob is a remarkable low grassy point on the North side of the port, about 1 mile from Boulder Point; to the westward of it is a shoal bay, into which flow some large streams. The best anchorage is about half a mile S.W. of the Nob in 6 or 7 fathoms.

It is high water, full and change, in Port Neville at 0^h 30^m, the rise and fall of tide being 17 feet.

The coast between Ports Neville and Harvey runs in a W. by S. direction, slightly indented. W. by S. $\frac{1}{2}$ S. 4 miles from the entrance of Port Neville, and one-quarter of a mile off shore, lies the *Slimpson Reef*, which covers at half flood.

PORT HARVEY, the next inlet westward of Port Neville on the North side of Johnstone Strait, runs in a northerly direction for 4 miles, with a breadth varying from one-quarter to three-quarters of a mile, and affords good and well-sheltered anchorage in 7 to 9 fathoms, muddy bottom, at the distance of half a mile from its head. From its head to the N.W. is a narrow gorge, which partly fills at high water and joins Knight Inlet. The soundings in the entrance vary from 60 to 80 fathoms, shoaling rapidly towards the head. *Broken Islands*, off the East side of the entrance, are low, rugged, and of small extent.

HAVANNAH CHANNEL, the western entrance of which is $1\frac{1}{4}$ mile North of Broken Islands, runs in a north-easterly direction from the East side of Port Harvey, connecting it with Call Creek. Its length is about 4 miles, and its breadth varies from one-half to 1 mile. There are several islands within it, which lie mostly in mid-channel. *Boughey Bay*, in the S.E. part of Havannah Channel, is about 1 mile deep in a southerly direction, and half a mile broad. A vessel may anchor in this bay at a distance of half a mile from the head. *Browning Rock*, in the North part of Havannah Channel, about one-third of a mile North of Hull Island, has only 12 feet over it, and lies nearly in the fairway of the channel to Call Creek.

CALL CREEK, the South part of which may be said to commence at the N.E. point of Havannah Channel, is an inlet of considerable extent, its length in a north-easterly direction being 12 miles, and its breadth varying from one-half to $1\frac{1}{4}$ mile. The shores on either side are high and precipitous, rising abruptly to mountains from 1,000 and 4,700 feet in height. The head terminates in a low swamp.

Chatham Channel, the East part of which commences at Root Point, the N.W. extreme of Havannah Channel, trends to the westward, connecting these waters with Knight Inlet. It is not recommended to use this channel. Captain Vancouver's tender, the *Chatham*, a small brig, passed through this channel to the westward in July, 1792, and the least water found was 3 fathoms.

It is high water, full and change, in Port Harvey at 0^h 30^m, and the rise and fall of tide is 10 feet.

Escape Reef, lying 2 miles West of Broken Islands, and half a mile off the North shore of Johnstone Strait, is about a cable in extent, has 4 feet least water on it, and is marked by kelp in the summer.

Forward Bay, 3 miles W.S.W. from Port Harvey, is a slight bend in the coast, about $1\frac{1}{4}$ mile broad, and three-quarters of a mile deep, with a small islet 30 feet high off its S.W. point. Its shores are moderately high, and a bank extends nearly 3 cables from its head. This bay affords good anchorage, in 14 to 10 fathoms, off the edge of the bank; in entering it from the eastward guard against the Escape Reef. From Forward Bay the northern shore of Johnstone Strait becomes comparatively low, and trends

W. by S. for 15 miles to Weynton Passage, at the termination of the strait. *Boat Harbour*, a small cove affording shelter to boats, is 6 miles westward of Forward Bay.

Hanson and Cracroft Islands, between Boat Harbour and Weynton Passage, are low, with rocky shores, and are separated by a passage 1 mile wide. The South side of Hanson is 3 miles long, and off its S.W. point are some rocks extending for 2 or 3 cables to the westward. Cracroft, to the eastward of it, is about 2 miles long; and off its South part, at the distance of half a mile, are the Sophia Islets, of small extent.

For a steamer, or sailing vessel with a fair wind, the navigation of Johnstone Strait is perfectly easy, it being only requisite to keep in mid-channel, except when nearing Helmcken Island from the eastward, when a vessel ought, after passing Thurlow Island, to keep within three cables of the southern shore, or Camp Point, till past the Ripple Shoal, which, from being marked with kelp, is likely to have less than 7 fathoms over it. In the vicinity of Helmcken the tides are strong, but not enough to stop a steam-vessel of moderate power. To the westward of it they have no great strength.

BROUGHTON STRAIT, which connects Queen Charlotte Sound with Johnstone Strait, is upwards of 14 miles in length, East and West, the breadth varying from 4 miles at the East to 1 mile at the West entrance. Its southern shore is formed by Vancouver Island, and the northern one by the South side of Malcolm Island, and both, except near Beaver Cove, are low. There are several islands, rocks, and shoals in the eastern part; but a clear navigable passage along the southern side half a mile wide in the narrowest place, which is abreast Alert Bay in Cormorant Island.

TIDES.—In Broughton Strait it is high water, full and change, at 0^h 30^m, the rise and fall of tide being 14 or 15 feet.

Beaver Cove, at the S.E. extreme of Broughton Strait, runs in upwards of a mile in a southerly direction, and is half a mile wide; its shores are high, and the depth is too great for anchorage. *Mount Holdsworth*, a remarkable conical peak, 3,000 feet high, and very conspicuous from the eastward, rises 3 miles to the S.W. of the cove.

Nimkish River, which flows into a shallow bay on the South shore, 5 miles westward of Beaver Cove, is upwards of a cable wide at entrance, with 2½ fathoms, but only navigable for any distance by canoes. On the North bank of the Nimkish, at the entrance, is a small plateau of grassy land, on which are the ruins of a large native village, called *Oheslakee*.

Port McNeill, on the South side of Broughton Strait, about 10 miles W. from Beaver Cove, runs in a W.S.W. direction for 2 miles, is three-quarters of a mile broad, and affords a good, well-sheltered anchorage, in 6 to 9 fathoms. From Ledge Point, the North point of entrance, a narrow ledge with 3 to 5 fathoms on it, runs out E.N.E. 1½ mile, and kelp grows over it

North Pacific.

in summer. *Eel Reef*, lying 9 cables S.S.W. from Ledge Point, and about 2 cables off the South shore of the port, covers at three-quarters flood. The coast from Port McNeill runs about W.S.W. 4 miles to the entrance of Queen Charlotte Sound.

Weynton Passage.—*Pearse Islands*, in the centre of Broughton Strait, at its eastern entrance, are a group of small low islands, with some rocks extending a short distance North and S.E. of them. Weynton Passage, between Hanson and Pearse Islands, is about $1\frac{1}{4}$ mile wide; and unless wanting to anchor in Mitchell Bay, it ought not to be used. *Race Passage*, between Pearse and Cormorant Islands, is two-thirds of a mile wide, but a rock lies in mid-channel at its South part. The passage is dangerous. *Cormorant Island* lies in the centre of the strait, to the West of Pearse Islands. It is about 150 feet high, and $2\frac{1}{4}$ miles long, East and West. Gordon Point, its S.E. extreme, is $2\frac{1}{4}$ miles W. by N. from Beaver Cove. *Alert Bay*, on the South side of Cormorant Island, is nearly 1 mile wide, and half a mile deep, affording a good and well sheltered anchorage in from 6 to 9 fathoms, muddy bottom. *Yellow Bluff*, the S.W. point of the bay, may be recognized by a remarkable yellow cliff at the extreme of the point. *Haddington Island*, 7 miles West of Beaver Cove, in the centre of Broughton Strait, is small. Its South and West sides are steep-to, but from the northern one a bar, with as little as 9 feet water in some parts, runs across the strait to Malcolm Island.

Between Haddington Island and the ledge running off from the North point of Port McNeill, is a passage three-quarters of a mile wide, with not less than 7 fathoms water in mid-channel.

MALCOLM ISLAND, which forms the North side of Broughton Strait, is $13\frac{1}{4}$ miles long W.S.W. and E.N.E., with an average breadth of nearly 2 miles; the shores are generally low, a sandy beach extending off a short distance from them. On its South side are *Mitchell* and *Rough Bays*, in which vessels may anchor in 6 or 8 fathoms. *Donegal Head*, its East point, is high, clifty, bordered by a beach, and the tide runs strong in its vicinity. *Dickenson Point*, on the South side of the island, is connected by a bar, with 9 feet in some parts, to Haddington Island.

DIRECTIONS.—In navigating Broughton Strait from the eastward, when abreast Beaver Cove in mid-channel, a W. $\frac{1}{4}$ S. course, to pass not more than 2 cables South of Cormorant Island, will keep a vessel clear to the northward of Nimpkish Bank, and when the West point of Cormorant Island bears N. by E. she will be westward of it; then steer to round the S.W. point of Haddington Island within a quarter of a mile, to avoid the ledge off Ledge Point; when the North shore of Cormorant Island opens of Haddington Island E. by N., a vessel may steer out of the strait in mid-channel. None, except small craft, should go to the northward of Haddington Island.

Sailing vessels of any size would find it tedious to beat through this strait, and as there are several dangers it is not recommended to do so.

QUEEN CHARLOTTE SOUND is an extensive arm of the sea, connecting the inner waters North of Vancouver Island with the Pacific. It was so named by Captain S. Wedgborough, of the *Experiment*, in 1786. Its length is upwards of 30 miles, running in an easterly direction, and its breadth varies from 10 to 20 miles, being bounded on the North by the shores of British Columbia, and on the South by the North shore of Vancouver Island. In the North and N.E. parts are innumerable rocks and islands, of which little is at present known; but along its southern sides are two broad and narrow channels to the Pacific.

Broughton Strait enters this sound at its S.E. part. From thence to Thomas Point the Coast of Vancouver runs W. by N. for 9 miles, and is low; it is bordered the whole distance by a beach composed of sand and boulders, and foul ground marked by kelp exists off it, from one quarter to half a mile.

BEAVER HARBOUR, on the South side of the sound, 9 miles westward of Broughton Strait, is 3 miles wide at entrance and 2 miles deep. The harbour is protected or formed by several islands lying across, and within the entrance; its shores are low, and from the South shore a bank extends off 3 or 4 cables; a short distance inland from its western side are seven remarkable hills, varying in height from 400 to 640 feet. There is good anchorage in the South and West parts of the harbour, but north-easterly winds send in a heavy sea, rendering it impossible to land on the South shore for days together.

Fort Rupert, a Hudson Bay Company's fort or trading post, is on the South shore; it has been established several years, and is in charge of a chief trader. Adjacent to it is a small quantity of clear land, also a very fine garden, where fruit, and vegetables common to the climate, are grown in great abundance. In the vicinity of the fort is a large native village.

Thomas Point, the S.E. extreme of the harbour, is low and rocky; some rocks lie upwards of 2 cables off it to the westward. The channel between it and Deer Island is about 4 cables wide, and clear of danger. *Moffat Rock*, 8 cables to the westward of Thomas Point, is 3 cables off shore, just at the outer edge of the bank, and uncovers at low water.

Deer Island, two-thirds of a mile North of Thomas Point, is about $1\frac{1}{2}$ mile in circumference, wooded, and about 240 feet high; extending nearly 4 cables off its N.W. part is a reef marked by kelp, with 9 feet water over it. *Round Island*, half a mile N. by E. of Deer Island, is small, but high, and conspicuous from the eastward. *Peel Island*, in the North part of Beaver Harbour, is three-quarters of a mile long S.W. and N.E., and between it and the West shore of the harbour is a passage 2 cables wide in

the narrowest part, with 17 fathoms water. There is a good channel into the harbour, close along the East side of Peel Island, which is steep-to. *Cattle Islands*, which lie in the middle of the harbour, are small and connected with each other at low water. At $1\frac{1}{2}$ cable South of them is *Shell Islet*, the observation spot on which is in lat. $50^{\circ} 42' 36''$ N., long. $127^{\circ} 25' 7''$ W.; a reef awash at high water lies 1 cable South of it. *Cormorant Rock*, lying one-third of a mile off the western shore of the harbour, and nearly half a mile West of Shell Islet, covers at high water.

Pedulus Passage, leading from the West part of Beaver Harbour to the northward, is 2 cables wide in its narrowest part, and has not less than 17 fathoms in mid-channel.

Beaver Harbour is easy of access to either sailing vessels or steamers. There are three passages into it, but the southern one, between Thomas Point and Deer Island, is the best, and generally used, being wide enough for a vessel to beat through.

It is high water, full and change, in Beaver Harbour at $0^h 30^m$, and the rise and fall is from 15 to 16 feet.

Hardy Bay, to the westward of Beaver Harbour, and separated from it by Dillon Point, runs in a southerly direction for 4 miles; its breadth at the entrance is 2 miles, narrowing to the head. There is no anchorage, except in the small creek at the head, which is difficult of access, and should not be used by a stranger.

GOLETAS CHANNEL, which runs along the North shore of Vancouver Island to the Pacific, is 22 miles long East and West, with a breadth varying from 1 to $2\frac{1}{2}$ miles. Its shores are high, rugged, and steep-to, except in the western part, and may be generally approached to a quarter of a mile. The northern side is composed of a group of islands, mostly small, through which are several navigable passages. There are four anchorages within the channel; Shushartie Bay on the South side; Port Alexander, Shadwell Passage, and Bull Harbour on the North side; and all, with the exception of the latter, easily accessible to sailing vessels. Duval Point, on the South side at the eastern entrance of the channel, is 15 miles West of Broughton Strait.

The soundings throughout the channel to the West entrance are very deep, varying from 190 to 80 fathoms, but there the bottom suddenly rises from 40 to 7 and 9 and in one part to less than 3 fathoms, forming Nahwitti Bar, stretching completely across the channel, and in a great measure preventing any heavy sea rising inside it during westerly gales.

Tides.—It is high water, full and change, in the Goletas Channel at $0^h 30^m$, and the rise and fall varies from 12 to 14 feet. The streams in the East part of the channel run from 1 to 3 knots, but near the West entrance, in the vicinity of the Nahwitti Bar, they are much stronger, run-

ning from 2 to 5 knots, turning shortly after high and low water by the shore.

Shushartie Bay.—From Duval Point the South shore of Goletas Channel runs 15 miles in a westerly direction to Shushartie Bay, with a rugged rocky outline; it is everywhere steep-to. Shushartie Bay is about half a mile in extent, and its shores are high, except at the head, from which a sand-bank runs off more than 2 cables. There is a very limited but fairly sheltered anchorage just inside the N.E. point of bay, in about 13 fathoms, at the distance of a cable off shore, but from the steepness of the bank it should only be considered as a stopping place. *Dillon Rock*, which covers at one quarter flood at $1\frac{1}{2}$ cable West of the East point of bay, is in the way of vessels entering from the eastward.

Shingle Point, 2 miles West of Shushartie Bay, is low; a beach runs off it a short distance; westward of this point it is difficult to land, except in fair weather.

CAPE COMMERELL, 22 miles West of Duval Point, is the northernmost point of Vancouver Island, and the South point of the West entrance to Goletas Channel. The cape is low, and some rocks extend off it for nearly 2 cables. There is an Indian village on the East side of the cape.

Gordon Group consists of a number of small islands running in an East and West direction for 5 miles, and bordering the North part of the East entrance of Goletas Channel. They are high and steep-to, and on the eastern or Doyle Island is Miles cone, a remarkable summit 380 feet high.

Duncan Island, 1 mile South of the Gordon Group, is about a mile in circumference, and 300 feet high. *Christie Passage*, between the West side of the Gordon Group and Balaklava Island, is half a mile wide. Its shores are free from danger. *Browning Passage*, to the West of Balaklava Island, between it and Galiano Island, runs in a north-westerly direction from the Goletas to New Channel. Its length is about 3 miles; it is deep, and a mid-channel course through is free from danger. The tide is very weak in this channel.

GALIANO ISLAND, the largest of the islands on the North side of Goletas Channel, is of triangular shape, nearly 8 miles long, and $3\frac{1}{2}$ miles broad, the base fronting to the southward. The shores are very much broken along the North and East sides; a remarkable peak of conical shape, 1,200 feet high, *Mount Lemon*, rises near its S.W. part, and Port Alexander is formed at its S.E. extreme.

Port Alexander, upwards of 7 miles from Duval Point, and on the West side of Browning Channel, runs in a north-westerly direction for $1\frac{1}{2}$ mile, with a general breadth of about 4 cables. This port is easy of access to steamers and sailing vessels with a fair wind, and affords good anchorage in 12 to 13 fathoms, half a mile from its head, well sheltered from all except south-easterly winds.

Shadwell Passage, in the N.W. part of the Goletas Channel, between Galiano and Hope Islands, is $3\frac{1}{2}$ miles long in a northerly direction, and its breadth varies from one half to $1\frac{1}{2}$ mile. The soundings in the South part of this passage are from 80 to 100 fathoms, decreasing rapidly from 9 to 13 fathoms to the northward.

Vansittart Island, in the centre of the passage at its North part, is 1 mile long. West of it are some rocks and small islets. *Willes Island*, at the S.E. part of the passage, is steep-to, and may be approached to a cable.

Centre Island, in the middle of the passage, and 5 cables S.W. from Vansittart Island, is small. *One Tree Islet*, 4 cables West of Vansittart, is small, about 40 feet high, and has a single tree on its summit, which is very conspicuous when seen from the northward, and of great use in identifying the passage. *Cape James*, the N.W. extreme of Shadwell Passage, is a rocky bluff; some rocks extend off it to the southward for a short distance, and foul ground, marked by kelp, exists between it and Turn Point.

Shadwell Passage may be used by steamers or sailing vessels with a fair wind. It would hardly be prudent to beat a large vessel through it, as there is generally a heavy swell and strong tide in the North part. It is the passage usually taken by the Hudson Bay Company's vessels when bound North from the inner waters.

HOPE ISLAND, the westernmost of the group which form the North side of Goletas Channel, is 6 miles long, East and West, and its greatest breadth is $3\frac{1}{2}$ miles. The island is moderately high, and its shores are very much broken. The sea breaks heavily along its North and West sides, and off Mexicana Point, the western extreme, a reef extends 3 cables. The South shore is steep, and may be approached to one quarter of a mile.

Bull Harbour has its entrance on the South side of Hope Island, 2 miles from the western entrance of Goletas Channel. Though small, this harbour affords a very secure landlocked anchorage. It runs in a northerly direction for $1\frac{1}{2}$ mile across Hope Island, its head being only separated from the N. shore of the island by a narrow rock of low land 403 feet wide; its breadth at the entrance is 5 cables, contracting to 1 cable at half the distance from the head, after which it again increases to nearly 2 cables.

Indian Island, $1\frac{1}{2}$ cable North of the narrowest part of the entrance, is small, but completely shuts in the harbour to the southward. The anchorage is to the northward of this island, in about 4 fathoms water, but there is only room for one or two vessels of moderate size to lie moored. If intending to enter Bull Harbour, steer up mid-channel, passing East of Indian Island, and moor immediately the vessel is North of it, anchors North and South. Steamers, or only small sailing vessels, should use this anchorage, as from its narrow and tortuous entrance, it is rather difficult of access to long vessels.

Nahwitti Bar, or ledge, stretching across the West entrance of the Go-

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letas Channel, is of sandstone formation, and on the eastern edge rises sud-
denly from 40 to 9 fathoms, the depth increasing very gradually to the
westward. Its breadth within the 10-fathoms line is from 1 to nearly 3 miles,
broadest at the South part, where are several shoal spots, called *Tatnall Reefs*,
with $2\frac{1}{2}$ and $3\frac{1}{2}$ fathoms, at a distance of $1\frac{1}{4}$ mile from the South shore;
northward of these patches the depths vary from 6 to 9 fathoms. In
heavy westerly gales the sea breaks right across the Goletas Channel at
this bar.

Lemon Point, Galiano Island, open North of Shingle Point, Vancouver
Island, bearing E. by N., leads over the Nahwitti Bar in the deepest water
from 7 to 9 fathoms, well to the northward of Tatnall Reefs.

NEW CHANNEL, to the northward of the Goletas Channel, and separated
from it by the islands which form the North shore of the latter, is an
extensive clear passage to the Pacific Ocean, about $12\frac{1}{2}$ miles long, and a
breadth varying from $1\frac{1}{2}$ to 4 miles. Its depth in the shoalest part is 60
fathoms, near the eastern entrance, and its shores, except near the West part
of the Gordon Group, may be approached to nearly half a mile; the North
limit of the channel is formed by Walker Group to the eastward, and a few
low rocks and islets to the N.W.

Generally a heavy swell sets through New Channel from the westward,
and with the exception that there is more room for a large vessel to work
in or out than in Goletas Channel, there is no reason to use it in pre-
ference to the latter, unless, if running in before a heavy westerly gale,
the sea were breaking across the West entrance of Goletas Channel at the
Nahwitti Bar.

Doyle Island, the south-easternmost of the Gordon Group, and at the
point of New Channel, is three-quarters of a mile long, and, as before
stated, has a remarkable summit, 380 feet high, Miles Cone, on its centre.
The *Crane Islets* are small, 30 feet high, and steep-to, there being 100
fathoms water at a cable's distance. They lie $2\frac{1}{2}$ miles westward of Doyle
Island, and about 3 cables North of Gordon Group.

Boyle Island $1\frac{1}{2}$ mile West of Crane Islets, and half a mile North of
Hurst Island, is small; at half a mile N.W. of it is the *Grey Rock*, which
covers at one quarter flood, and is dangerous to vessels beating through
this channel.

The North shore of Balaklava Island is rugged, and half a mile N.W.
from its N.W. point are three low islets, 6 feet above high water, at the
North entrance to Browning Channel.

The North shore of Galiano Island is also rugged; some outlying rocks
lie a short distance off it, but it may be approached to one-third of a
mile.

WALKER GROUP, at the N.E. part of New Channel, from 2 to 3 miles
North of its South side, is composed of a number of small islands and rocks,

covering an extent of 6 miles in a westerly direction, and 2 miles broad, the highest is about 300 feet above the sea; among them are several small creeks and bights, which would afford shelter to boats, or even small craft. *Castle Point*, at the S.E. extreme of the group, is bold, cliffy, and steep-to, with no bottom at 60 fathoms 2 cables South of it. *White Rock*, at the South extreme of Walker Group, lies 2 miles W.S.W. from Castle point; it is 4 feet above high water. *Nye Rock*, off the South end of Schooner Passage, at the West part of the group, covers at high water; it lies W. $\frac{1}{2}$ N. $2\frac{1}{2}$ miles from White Rock, and may be approached to 2 cables on the South side, but large vessels should not stand inside it to the northward.

Redfern Island, the S.W. of Walker Group, is about half a mile long, and one quarter of a mile wide; half a mile S.E. of it are some rocks just above high water. *Prosser Rock*, 2 miles W. by N. $\frac{1}{2}$ N. of Redfern Island, is small, about 2 feet above high water. Nearly a mile farther in the same direction is *Bright Islet*, 100 feet high. *Pine Island*, at the N.W. part of New Channel, is about a mile in circumference, low, and wooded, and conspicuous from the westward.

Storm Islands, in the centre of Queen Charlotte Sound, $2\frac{1}{2}$ miles northward of Pine Island, are a narrow chain of islets extending 2 miles East and West.

The **COAST** from Cape Commerell (page 421), the N.W. point of Vancouver Island, takes a S.W. direction for 16 miles to Cape Scott. It is rather low, but rises at a distance inland to hills 800 and 1,000 feet high; it is indented by several bays, which, however, are too open to afford any shelter, except in southerly winds; foul ground extends off in some places more than one mile.

HECATE ROCK, lying W. $\frac{1}{2}$ S. $1\frac{1}{2}$ mile from Cape Commerell, and three-quarters of a mile off shore, covers at three-quarters flood, and the sea breaks heavily over it. Lemon Point, Galiano Island, just open of or touching Shingle Point, Vancouver Island, E. by N., leads three-quarters of a mile North of it.

At Cape Scott the flood comes from the southward, and rounding the cape sets into the Goletas Channel, its strength varying from 1 to 3 knots.

SCOTT CHANNEL, between Cape Scott and the Scott Islands to the westward, is $5\frac{1}{2}$ miles wide, with soundings in it varying from 25 to 40 fathoms. It is a safe navigable channel for any class of vessel, the only known dangers in it being the rocks extending nearly a mile West of Cape Scott. The tide runs through from 1 to 3 knots, the flood from the southward.

SCOTT ISLANDS extend nearly 20 miles in an East and West direction; the principal ones are five in number, with some adjacent smaller islets. There are wide passages between the western islands, but as no soundings have been obtained in them, and strong tide ripples and overfalls have in-

variably been observed raging there, no vessel should venture among or through them, unless compelled to do so.

Westward of Cape Scott the tides set with considerable strength to the North and South across the entrance of Goletas Channel, and a vessel passing out northward of the Scott Islands must be aware that she is not set down too near them with the ebb stream.

Cox Island, the easternmost and largest of the group, is about $2\frac{1}{2}$ miles in extent, with iron bound rocky shores and several off-lying dangers. Its height is upwards of 1,000 feet. This island forms the western boundary of the Scott Channel, and is upwards of 5 miles W. by S. from Cape Scott.

Lanz Island, separated from Cox Island by a passage half a mile wide, is upwards of 2 miles long in a westerly direction, and a mile broad; its shores, like Cox Island, are rocky, and it rises near the centre to a summit 1,177 ft. above the sea; both the islands are wooded.

East Haycock, a small islet 80 feet high, is $2\frac{1}{2}$ miles S.W. from Lanz Island; it has a rugged outline. *West Haycock*, 5 miles W. $\frac{1}{2}$ S. from East Haycock, is small and rocky, about 180 feet high.

Triangle Island, the westernmost of the group, is 26 miles W. by S. from Cape Scott; it is 680 feet high, about a mile in extent, and differs from the other islands in being very precipitous and bare of trees, and has a remarkable gap in its summit. A ledge or reef extends 1 mile N.W. of it; to the eastward are three low islets, the outermost of which, 40 feet high, is $1\frac{1}{2}$ mile from Triangle Island.

In navigating near the Scott Islands, it is recommended to give them a good offing, especially in a sailing vessel, as the tides set very strongly through the passages between them.

This will complete the description of the circuit of Vancouver Island. Its seaward coast has been included in the previous Chapter, and this terminated at Cape Scott. Of its interior, it would be out of place to dwell upon here; but at the conclusion of this Chapter, some of the more recent works on the subject are enumerated.

The COAST of British Columbia, to the northward of Queen Charlotte Sound, is less known and frequented than that adjacent to Vancouver Island. For its delineation and description we are chiefly dependant on the excellent work of Vancouver. Although this is now of old date, it is of less importance, inasmuch as from the nature of the coast, an iron-bound region not liable to change its character, the careful survey, as far as it went, will be sufficient guide for the present, although no one can predict what its future may be. As it is, it remains in its primeval condition.

CAPE CAUTION, which forms the N.E. limit of Queen Charlotte Sound, was so named by Vancouver on his second visit, from the dangerous navigation in its vicinity. It makes a conspicuous cape, terminating in rugged, rocky, low hummocks, that produce some dwarf pine, and other small trees and shrubs. Off the cape are some very dangerous breakers, consisting apparently of three distinct patches, occupying the space of a league. Their eastern part bears from Cape Caution W. by N. $\frac{1}{2}$ N., distant about 5 miles; but the rocks that lie off the shore to the northward of the cape reduce the width of the channel between them and the breakers to about a league, in which there does not appear any obstruction which is not sufficiently conspicuous to be avoided.

The **Virgin and Pearl Rocks** are two very dangerous clusters off the entrance to Smith Inlet. They were discovered and named by Mr. Hanna, in 1786. The Virgin Rocks lie W. by N. $\frac{1}{2}$ N. 13 miles from the South point of Smith Inlet; and the Pearl Rocks, N.W. $\frac{3}{4}$ N. 8 miles from the same point. They lie in a line, W.S.W. from the South extreme of Calvert Island, 11 and 4 miles distant respectively.

SMITH INLET.—The entrance lies about 7 miles North of Cape Caution, the intervening coast being bestrewn with rocks and islets. The entrance into it is nearly closed by rocky islets, with innumerable rocks, as well above as beneath the sea, rendering it a very intricate and dangerous navigation for shipping. About 3 leagues within the entrance the rocks and islets cease to exist, and the inlet contracts to about half a mile in general width.

River Canal is about a league to the northward of the North point of Smith Inlet. The entrance to it appears less dangerous than the latter. It has, however, on its southern side many rocky islets and rocks, but none were discovered beneath the water level. By keeping on the North side of the entrance, which is $1\frac{1}{2}$ mile across, a fair navigable passage is found, about half a mile wide, between the North shore and the rocky islets that lie off its southern side. There was no bottom found in the middle with 80 fathoms of line. From River Canal, a channel diverges towards the South end of Calvert Island. It is very narrow and intricate, leading through an immensity of rocks and islets to Point Addenbrooke, in Fitzhugh Sound.

CALVERT ISLAND forms the exterior coast northward of River Canal, and within it is *Fitzhugh Sound*; the former was discovered and named by Mr. Duncan, the latter by Mr. Hanna. Off the South point of the island are two small islets. The eastern side of the island forms a steep bold shore, rising abruptly from the sea to a great height.

Safety Cove (*Port Safety* of Mr. Duncan?) is 2 leagues North of the South extreme of Calvert Island, on the West shore of Fitzhugh's Sound. It terminates in a small beach, near which is a stream of excellent water. The

depth is, however, rather great, 17 to 30 fathoms. It is the first place that affords safe and convenient anchorage on the western shore within Fitzhugh Sound. Vancouver found it a comfortable retreat, in August, 1792. High water at the time the moon passes the meridian; rise and fall about 10 feet.

At 13 miles northward of Safety Cove is the passage which insulates Calvert Island. Vancouver places its N.E. point in lat. $51^{\circ} 45'$. South of this lies a *sunken rock*, which, though near the shore, is dangerous, being visible at low tides only by the surf which breaks on it. From this point the passage extends S.W. by W. $\frac{1}{4}$ W., about 7 miles. Between the rocks on its northern shore is a passage, generally 1 or 2 miles wide, but rendered unpleasant by the want of soundings, the depth being beyond 150 fathoms.

Fitzhugh Sound extends for 26 miles from Safety Cove, in nearly a true North direction to *Point Walker*, where it separates into two arms. The easternmost was named by Vancouver after Edmund Burke. Its S.E. point is *Point Edmund*, about 2 miles E.S.E. from Point Walker. There are some rocks off the points, but the channel is fair. The sides of the canal are composed of compact, stupendous mountains, and nearly perpendicular rocky cliffs, producing pine trees.

Restoration Cove is about 1 mile within the entrance to the eastern branch of Burke Canal. It has a fine sandy beach. The breadth of the cove at its entrance, in a North and South direction, is about $1\frac{1}{4}$ mile, and its depth about three-quarters of a mile. The soundings, though deep, are regular, from 60 fathoms at the entrance, to 5 and 10 fathoms close to the shore. The land on the opposite side of the arm is $2\frac{1}{2}$ miles distant. The tide rises and falls 14 feet.

BURKE CANAL extends to the N.E., maintaining the same breadth. Its north-western side is formed by a large island, named by Vancouver *King Island*. After continuing 11 miles in an easterly direction from the N.E. point of King Island, the canal separates into two arms to the N.E. and S.E. at Point Menzies. These arms were named by Vancouver *Ber-tinck Arms*. The width of that to the S.E. in general a little exceeds a mile, and the country exactly resembles that contiguous to the branches, which have been so repeatedly described.

Sir Alexander Mackenzie reached the Pacific after his long, arduous, and perilous journey across the continent at this point a month after Vancouver's party had left. He came to a village of 26 large houses, where Mr. Johnstone had come on June 1st, 1793. He coasted along King Island, and learned that Macnab (as the natives termed Vancouver) had been there with his large canoe. He commenced his return July 22, 1793.

This is as desolate, inhospitable a country as the most melancholy creature could be desirous of inhabiting.

New Aberdeen, a recent establishment, is at the head of the N.E. Bentinck Arm. The old charts place "the village of Rascals" here—an expressive name. It was afterwards called *Kougotes*, or *Belhoula*. The Belhoula, or Bella Coola River, flows into the head of the arm in a W.S.W. direction. Much attention has been directed to this place, as a point of departure for the upper course of the Fraser River, and a "trail" exists to Fort Alexandria below the mouth of the Quesnelle.* Captain Mayne gives an account of several expeditions which have crossed the intermediate country (pages 145—151).

The N.E. point of King Island was named *Point Edward*. Opposite to it is the entrance of *Dean Canal*, which penetrates many miles in a N.E. and North direction, terminating in low marshy land.

Cascade Canal is to the N.W. of Point Edward. Its shores are bounded by precipices more lofty than any hereabouts; and from the summits of the mountains, particularly on the N.E. shore, are some extremely grand and tremendous cascades. The canal which forms the N.W. side of King Island runs S.W. to Fisher Canal, which separates the southernmost of the *Princess Royal Islands* from the main land.

The **PRINCESS ROYAL ISLANDS** form a portion of that immense archipelago which here fronts the American continent. On its western side it is uneven, rocky, and of moderate height. The eastern shore rises more abruptly, and bounded behind with lofty snowy mountains.

Port John is 10 miles nearly North of the entrance to Burke Canal before described. It is on the western side of King Island, and forms a good harbour. Its North point of entrance bears N. by E. 2 miles from its South point.

To the North of Port John is the entrance to the canal previously mentioned, which passes round the N.W. side of King Island toward Cascade and Dean Canals. Fisher Canal continues its northern course for 12 miles above Port John, its shores being comparatively of moderate height. From this point it takes a westerly course to Milbank Sound, and forms the North limit of the southern Princess Royal Island. The course is first about W. by N. $\frac{1}{2}$ N. a league, the shores being low and rocky, with many detached rocks lying off them. The channel then takes a more southerly course, and, although there are many rocks and breakers in it, they are all sufficiently conspicuous to be avoided in fair weather.

MILBANK SOUND is an opening between the Princess Royal Islands, in lat. $15^{\circ} 13'$. Its S.E. point is *Cape Swaine*, so named after the third lieutenant

* A terrible tragedy occurred on this road in May, 1864. The treacherous Indians destroyed nearly the whole of a party who were making their way to the Cariboo Gold Fields. The particulars are quoted in Mr. F. Whympers's interesting work, pp. 34, 35.

of the *Discovery*, Vancouver's vessel. Milbank Sound was discovered and named by Mr. Duncan. Its N.W. point is *Point Day*, off which lie several very barren rocky islets. The southern side of the channel or sound, being entirely covered with trees and with low shores, is very pleasant in appearance but the northern sides are a rude, confused mass of low, rugged cliffs, bounded by innumerable rocky islets and rocks.

Fort M'Loughlin, distant a few miles from Milbank Sound, is (or was) one of the Hudson Bay Company's posts. "This very neat establishment was planned, in 1837, by Mr. Finlayson, of Red River, who left the place in an unfinished state to Mr. Manson, who, in his turn, had certainly made the most of the capabilities of the situation.

Several inlets or arms run up to the northward from the canal leading from Fisher Canal into Milbank Sound. They are very similar in character and need no particular description. The principal arm out of Milbank Sound is the westernmost, and runs in a general northerly direction for 30 miles, when it divides, one portion continuing to the northward, and a wider branch extending eastward to *Carter Bay* and *Mussel Canal*. These two last derive their names from one of Vancouver's party having died from the effects of poisonous mussels collected in *Poison Cove*, lat. $52^{\circ} 55'$, long. $128^{\circ} 1' W$. The whole party who partook of them were seized with a numbness about their faces and extremities, which soon extended to their whole bodies, accompanied with sickness and giddiness. This may serve as a caution here, though generally the shell-fish is wholesome.

From Carter Bay the principal inlet continues its northward course, and 5 miles beyond the junction is an opening, apparently communicating with the sea, running southward on the western side of the channel; 13 and 17 miles farther on are two openings on the opposite or eastern, which extend but a short distance inland. Vancouver found scarcely any inhabitants here. The tides rose 15 feet, and it was high water $10^h 15^m$ after the moon passed the meridian. Continuing northward, but bearing more to the westward, the canal still skirts the western shore of the Princess Royal Island, as far as its North extreme. Near this, on the eastern shore, is a commodious cove, where Vancouver anchored. A league northward is a small inlet, where a hot spring was discovered.

In sailing among the rocky precipices which compose the shores of the channels hitherto described, it is not always safe to make too free with them in sailing by; for they are frequently found to jut out a few yards at or a little below low water mark; and if a vessel should ground on any of those projecting points about high water, she would, on the falling tide, if heeling from the shore, be in a very dangerous situation.

To the North of this anchorage before mentioned, the channel continues between the main land and Hawkesbury Island. The shores are like the rest described, partly composed of lofty steep mountains rising nearly

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perpendicularly from the sea, and covered from the water side to their summits with pines and forest trees. It takes an irregular northerly direction for about 15 miles, when it turns eastward to *Point Staniforth*, placed by Vancouver in lat. $53^{\circ} 54'$, long. (corrected) $128^{\circ} 33' W$.

GARDNER CANAL runs 45 miles in an irregular course to the eastward; its upper part passing through a country that is almost an entirely barren waste, nearly destitute of wood and verdure, presenting to the eye one rude mass of almost naked rocks, rising into lofty mountains, whose towering summits, seeming to overhang their basis, gives them a tremendous appearance. The whole is covered with perpetual ice and snow, and many waterfalls descend in every direction in the summer.

The North point of Hawkesbury Island is opposite Point Hopkins. Its South point is *Point Cumming*, in lat. $53^{\circ} 18\frac{1}{2}'$. It is thus about 33 miles in length, and from 3 to 11 miles broad. The continent to the westward forms a point, which extends to about the same latitude as the South point of Hawkesbury Island, and having one of the numerous arms or canals dividing them.

The North point of *Gil Isle* is opposite Point Cumming, and the South opening to the inlet last mentioned. There is anchorage at this North point, it is in a bay on the N.E. part of the island, about 2 miles from its northern extremity on the western shore of the islet. Here Vancouver anchored in 40 fathoms, stones, shells, and sandy bottom. Vancouver called it *Fisherman Cove*. Lat. $53^{\circ} 18\frac{1}{2}'$, long. $128^{\circ} 57'$.

There is also anchorage directly to the S.W. of the North point of *Gil Isle*, or *Ysla de Gil*, which was so named by Senr. Caamano, in 1792. It is about 5 leagues long, North and South, and 5 miles broad; of a moderate though uneven height. The *Isla de la Campania*, to the westward of it, has a conspicuous ridge of mountains, and, when seen from eastward, with a remarkable peak, nearly in the centre, considerably above the rest.

Nepean Sound is to the northward of these islands, and that of *San Estevan*, which is the outermost. The general character of these islands differs little from that of the surrounding region. To the north-westward of these lie the extensive islands forming Pitt Archipelago and Banks Island, separated from the continent by Grenville Canal, and from each other by the Canal de Principe; the first so named by Vancouver, on his exploration in 1793, and the latter by Senr. Caamano, who first navigated it.

GRENVILLE CANAL.—The southern entrance to Grenville Canal is opposite to Fisherman Cove, the North point of *Gil Isle*. Its direction is N.W. $\frac{1}{2}$ N., and is nearly straight for 14 miles on this bearing to a small harbour, or rather cove, on its eastern shore. For 2 miles within it Mr. Whidbey (July, 1793) found the sea abounding in sea-otters, who sported about the boats. At this part it is not more than half a mile wide,

with straight and compact shores on each side. The shores of the arm beyond this are mountainous on the East or continental side, and low and rocky on the opposite; both producing pine-trees. From the small cove mentioned the arm continues in the same direction for 4 miles further, from an island off the N.W. point of the cove. It then stretches N.N.W. $\frac{1}{2}$ W., about 8 miles to the South point of an opening on the eastern or continental shore, about a mile wide, its opposite point of entrance lying North. N.W. $3\frac{1}{2}$ miles from this is a small cove on the East shore; and 10 miles further, N.N.W. $\frac{1}{2}$ W. is a bay about a mile wide and 2 deep, in a N.E. direction, with many islets and sunken rocks on it. The continental shore between these last is lined with innumerable rocks and islets, nor is the middle of the channel free from these obstructions. Seven miles to the north-westward of this, on the opposite or western shore, is an extensive opening, running to S.S.W., apparently dividing the land.

To the northward of this opening is a high island, about 7 miles long; and 10 miles North of it is *Point Lambert*, on the continental shore. To the N.E. of this point is *Port Essington*, an extensive sound, surrounded by a moderately elevated country, particularly on the N.W.; but to the North and East the view is bounded by lofty barren mountains, covered with perpetual snow. The entrance to Port Essington is narrowed by a shoal against Point Lambert, forming a rounding spit, of 3 to 6 feet water. The tide rushes in furiously.

Opposite to the entrance to Port Essington are some islands, forming the North side of the opening into Chatham Sound, to one of which the name of *Raspberry Island* was given by Vancouver, from the quantity of excellent raspberries he found here. The passage through is 2 miles long and about a mile wide between the islands, but mostly occupied by shoals, which contract it to a very narrow channel close to the southern side. To the N.W. of this channel Chatham Sound is interspersed in most directions with small islands, rocks, and shoals.

Point Hunt is very conspicuous, and forms the North point of Pitt Archipelago. It is in lat. $54^{\circ} 10\frac{1}{2}'$, and bears West 3 miles from the above-mentioned islands. From Point Hunt the shores of the land take an irregular direction of S.W. $\frac{1}{2}$ W. to *Point Pearce*, the intermediate space bounded by innumerable rocks and other impediments. Westward of this again the shore falls back considerably, forming a deep bay, with several small runings running south-eastward. Cape Ibbetson is the western point of this bay, and the N.W. of Pitt Archipelago. It is a very conspicuous projecting land.

Stephens Island lies to the N.W. of these points, and is about 4 leagues long. Between Cape Ibbetson and its S.W. point is a cluster of rocky islets and sunken rocks, which thus lie in the opening seaward of the channel between Stephens Island and Pitt Archipelago. Northward of Stephens

Island is an extensive and intricate cluster of islets and rocks, forming a complete labyrinth to navigators, but on its eastern side is a very commodious anchoring place, in lat. $54^{\circ} 18'$, long. $130^{\circ} 41'$, where Vancouver stayed in company with three ships in search of furs, &c., under the command of Mr. Brown. The group extends W.N.W., a league and a half from the North side of Stephens Island, and occupying a space of 2 miles in width. To the westward of this group, at the distance of 2 or 3 miles, lies a low detached rock, with some breakers near it; there are other lurking rocks lying about the same distance from Stephens Island.

The land, which is separated from the continent by Grenville Canal, and which we have been describing, although it was not traversed in the extent of 20 leagues, was still believed to consist of several islands, and therefore received the name of Pitt Archipelago, after the celebrated statesman.

The **CANAL DE PRINCIPE**, between the archipelago and Bank Island, extends from the North point of entrance into Nepean Sound to the North point of Bank Island, first N.W. $\frac{1}{2}$ N. to the South point of *Puerto de Canaveral*, and thence N.W. by W. $\frac{1}{2}$ W. to its N.W. point, in all about 14 leagues. The southern shore is nearly straight and compact, without soundings; the northern shore is much broken, bounded by many rocks and islets, and affording soundings in several places.

Port Stephens is 18 miles from the South end of the channel on the eastern shore. It was so named by Capt. Duncan, in the *Princess Royal*, in 1788. It is a small opening, the entrance of which is obstructed by many islets and rocks, presenting no very tempting appearance as a port.

Port de Canaveral (of Senr. Caamano) is also on the eastern shore. Its entrance, $4\frac{1}{2}$ miles wide, seems to be free from obstruction. Off its S.E. point is a small round island.

CHATHAM SOUND lies between Dundas and Stephens Islands and the main land. The southern entrances have been before described. *Brown Passage* enters the sound between the islands to the North of Stephens Island and Dundas Island. This latter, in a N.N.W. direction, is 15 miles long and 5 broad, East and West. The eastern shores of the sound are low, and somewhat indented with small bays, and bounded by a reef of rocks at the distance of a quarter of a mile off shore. The interior country is snowy mountains. The shores and islands in the sound produce large numbers of pine trees. In the northern part of the sound are two clusters of rocks with breakers around, one S.S.W. $\frac{1}{2}$ W. 8 miles, and the southernmost S.W. by S. $10\frac{1}{2}$ miles from Point Maskelyne. By daylight they are easily avoided, but by night or in fogs they must be very dangerous.

Point Maskelyne, so named after the astronomer, forms the S.E. point of the entrance to Observatory Inlet and Portland Canal. Off it lie two rocky

islets, and to the South of it a rocky island close to the shore. The opposite or N.W. point is *Point Wales*.

Works Canal.—Immediately East of Point Maskelyne is the entrance to a branch which takes a S.E. direction for 32 miles; its head approaching within about half a mile of the N.E. part of Port Essington, thus forming the land into a peninsula. Its S.W. shores are nearly straight and compact; its general width from $1\frac{1}{2}$ to 2 miles, excepting near the entrance. An arm diverges from its N.E. shore, at 23 miles within the entrance, and trends in a general N.E. direction, but is made into a tortuous channel by a remarkably steep, rocky precipice, which at high water becomes an island. It had formerly been appropriated to the residence of a very numerous tribe of Indians.

PORT SIMPSON was surveyed by Mr. Inskip and the officers of H.M.S. *Virago*, under Captain Prevost, R.N., in 1853. The southern entrance to it between Finlayson Island and the main is 4 cables wide where narrowest, and $1\frac{1}{2}$ mile long; it is very deep, but there are some sunken rocks near the shores. The middle entrance between the South end of Birnie Island and the North point of Finlayson Island is $1\frac{1}{2}$ mile wide, but has a dangerous middle ground, leaving an entrance on either side of it into the northern or southern harbours. This middle ground reaches to within 2 cables' lengths of the peninsula near which the fort stands. There is a rocky channel North of Birnie Island, and a deep but narrow channel between the peninsula and the tail of the middle bank. The fort stands on the S.E. side of the cove, on the North side of the neck. The anchorage is in lat. $54^{\circ} 34' N.$, long. $130^{\circ} 25\frac{1}{2}' W.$ High water $12^h 35^m$; spring tides rise $21\frac{1}{2}$ feet, and neaps $14\frac{1}{2}$ feet.

At 3 miles West of the South point of Birnie Island is a reef called the *Pointers*.

The *Skina River*, which is probably the *Simpson* or *Babine River*, enters the S.E. part of Works Canal, at 30 miles from Fort Simpson, and 10 from Port Essington. The salt water here is of a light blue colour, like that near the Fraser River.

Coal is found on the banks of the Skina River. It was visited by Mr. Downie in August, 1859, and may prove to be an important attraction at some future period.*

* Mr. Downie says: At Kitsagatla (on the Skina River) we entered on a most extensive coal country, the seams being in sight, and cut through by the river, and running up the banks on both sides, varying in thickness from 3 to 35 feet. The veins are larger on the East side, and are covered with soft sandstone; on the West side quartz lines the seams, which are smaller. The veins dip into the bank for a mile along the river, and could easily be worked by tunnels on the face, or by sinking shafts from behind on the flats, as they run in soft earth. I have seen no coal like this in all my travels in British Columbia and Vancouver Island. (See *Capt. Mayne*, Appendix, p. 451.)

Fort Simpson, one of the Hudson's Bay Company's establishments, was originally formed at the mouth of the Nass River, but was removed to the North point of Chimsain peninsula, washed on three sides by Chatham Sound, Port Essington, and Works Canal. It is the resort of a vast number of Indians. The anchorage is in lat. $54^{\circ} 33' 25''$, long. $130^{\circ} 18'$.—(Sir Geo. Simpson, vol. i. p. 207.)

At the mouth of Works Canal, N.E. of Point Maskelyne, is an island which divides the entrance into two channels. In the rear of this is a short arm called *Nass Bay*, and further N.E. is one more extensive.

OBSERVATORY INLET.—The principal inlet runs in a N.E. $\frac{1}{2}$ N. direction, and at 21 miles above Points Maskelyne and Wales the Portland Canal diverges from the principal one at Point Ramsden. Off this point are some dangerous rocks, only visible at low water, and opposite to it is a deep bay, with very shallow water all around it, except in the N.E. part, where a branch enters, bringing down muddy water, which is distinguished flowing down the principal arm.

Salmon Cove is 20 miles above Point Ramsden, and on the western shore of Observatory Inlet. It affords good anchorage, and every convenience. Here Vancouver's vessel remained for some time, in July, 1793; and here he placed his observatory, from which circumstance the name of the inlet is derived. A very great abundance of salmon were taken here, up a very fine run of fresh water that flows into the cove; but they were small, insipid, of a very inferior kind, partaking in no degree of the flavour of European salmon.

The lat. of the observatory was deduced as $55^{\circ} 15' 34''$, long. $131^{\circ} 3' 30''$; variation $25^{\circ} 18'$ E., dip. $75^{\circ} 54\frac{1}{2}'$. High water at $1^h 8^m$ after the moon passes the meridian, and the tide generally rose about 16 feet.

Beyond Salmon Cove the inlet extends 5 leagues in a North direction, when the western arm terminates, and the eastern arm extends the same distance, and forms the mouth of the *River Simpson*. The head of Observatory Inlet is much indented with small bays and coves, and abounding in some places with sunken rocks.

PORTLAND CANAL (so named from the noble family of Bentinck) diverges from Point Ramsden, in a N. by W. $\frac{1}{2}$ W. direction, for about 5 miles; thence it bears in a more northerly direction 5 leagues farther, and then trends a little to the eastward of North, terminating in low marshy land, in lat. $55^{\circ} 45'$, 70 miles from its entrance in Chatham Sound. The shores of this inlet are nearly straight, and in general little more than a mile asunder, composed mostly of high rocky cliffs, covered with pine trees to a considerable height; but the interior country is a compact body of high barren mountains, covered with snow. As the surveying party ascended, salmon in abundance were leaping in all directions.

The northern shore of the inlet, between Point Wales and Point Ramsden, is formed by several islands, behind which a channel runs parallel with the direction of the main inlet. This gradually decreases in width south-westward, continuing 13 miles from its N.E. entrance to an opening to the S.E. into the main channel. Pursuing the same direction, it enters much broken land, intersected by arms, forming an island about 10 miles in circuit, to the N.E. of which is an arm running in a N.E. direction, ending in low, steep, rocky shores.

At 7 miles a little to the North of West from Point Wales is the S.W. extremity of an island, from whence an arm extends in a N. $\frac{3}{4}$ W. direction, terminating in a fresh-water brook, in lat. $54^{\circ} 56'$, long. $130^{\circ} 40'$.

The Portland Canal, which may be considered to terminate here, is the boundary between the British possessions and the newly-acquired Alaska territory of the United States, is only frequented by the Hudson's Bay Company's officers in their steam-vessel for the purposes of occasional trade with the natives. The continental shore to the northward belonged to Russia, and was ceded, by purchase, to the United States in 1867, as detailed in the next chapter. One of the most important features of this region, as yet but little known and undeveloped, is the extensive archipelago, named Queen Charlotte Islands, which is imperfectly described as follows.

QUEEN CHARLOTTE ISLANDS.

This land was discovered nearly at the same period by the navigators of two nations. La Pérouse made the outer coast on August 10th, 1786, and followed it from South to North, for 50 leagues, in the ensuing ten days. Captain Lowrie, in the *Snow*, Captain Cook and Captain Guise, in the *Experiment*, sailed from Nootka on July 27th in the same year, and made the land in question soon afterwards, though the day itself is not now known. Thus the honour of discovery belongs to both the English and French. The name by which it is now known is derived from the vessel in which Captain Dixon made it in the year following, but only assumed that it was an island from conjecture, as it was not proved to be such till Captain Douglas, in the *Iphigenia*, sailed through the strait which divides it from the continent of America. It has also been called *Washington Island*, by Ingraham. Dixon Channel, which runs in between Queen Charlotte Islands and the Prince of Wales Archipelago, to the North of it, was discovered, perhaps, by Ensign Juan Perez, in 1774. It was next seen by Dixon, on July 1st, 1786, though he himself acknowledges that Captain Douglas was the first who sailed through it. He then sailed nearly round the island, afterwards repairing to Nootka. The eastern coast of the island was also examined and traded on by Captain Duncan, in the *Princess Royal*, in 1787; after doing so he pro-

ceeded to the eastward to some other islands, which he named the Princess Royal Islands (which have been before described), but which have been supposed to be identical with the archipelago of San Lazaro of De Fonta, previously considered to be apocryphal. A part of the features of this latter were examined by Duncan, and he anchored in *nineteen* of its harbours, not without being frequently exposed to the danger of losing his vessel, but he was indemnified by an ample trade in furs.

The outer or western coast only was cursorily examined by Vancouver in 1794, and the North side was sailed along by Captain D. Jacinto Caamano in 1791. That it consisted of several islands instead of one, as has usually been considered, was inferred by Dixon, or rather by Beresford, who wrote part of his voyage in 1787.

Thus our knowledge remained until quite a recent period, although it was regularly visited by traders. But when the adjacent countries became the scene of much interest from the discoveries of gold and coal, this group was also visited with the same object, and in 1853 H.M.S. *Virago* went around them, and to Mr. Geo. H. Inskip, R.N., we owe the chief part of the ensuing nautical description. It was examined in some parts, when gold was reported,* by Mr. Downie in July, 1859.

A more complete examination of the geology and natural history of the group was made by Robert Brown, Esq., F.R.G.S., in 1866, and from his paper to the Royal Geographical Society in 1869, we also have derived some information.

Climate.—Though situated so far North, the climate of the Queen Charlotte Islands, from their insular position, is much milder than that of the mainland. Some men who wintered upon them described the temperature as being moderate, little snow, and a great deal of rain. Indeed, all North of Fraser River the climate is very moist. At Sitka it rains almost continuously, the average rainfall amounting to nearly 89 inches per annum. When I arrived, on 1st of April, all the snow had vanished off the low lands, and the weather was mild and pleasant. Mosquitoes were abundant, and towards the end of the month humming-birds had begun to make their appearance.—(*R. Brown.*)

GENERAL REMARKS.—The following sailing directions for the Queen Charlotte Islands commence at Cape St. James, their southern extreme, and from thence proceed along their eastern side, named Dixon Channel; round Rose Spit, their north-eastern point; along the northern shore through Parry Channel; and back to Cape St. James, by the Pacific or western side.

The Queen Charlotte Islands consist of three principal islands, together

* There was a tradition that a Sandwich Islander, in the employ of the Hudson's Bay Company, while skinning a deer sold by an Indian, found that it had been shot with a nugget of gold.—*R. Brown, Esq.*

with several smaller ones, and are situated between lat. $51^{\circ} 57'$ and $54^{\circ} 21' N.$, and long. $131^{\circ} 11'$ and $133^{\circ} 0' W.$ The channels separating the principal islands are, Houston Stewart Channel, running between Prevost Island (the southernmost), and Moresby Island to the northward of it; and Skidegate Channel which separates Moresby Island from Graham Island (the northernmost).

CAPE ST. JAMES.—In approaching Cape St. James from the southward, the first land that will be seen (if it is clear) is the highest part of Prevost Island, at the back of Cape St. James. This cape is formed by several islets and rocks, and as it is reported that a sunken ledge extends nearly 5 miles off it, precaution is necessary in approaching this part of the coast. With Cape St. James bearing S. $70^{\circ} W.$ about $3\frac{1}{2}$ miles, and the outermost rock above water S. $41^{\circ} W.$ Mr. Inskip had 90 fathoms.

Mr. Gray, in the *Columbia*, informed Vancouver that he had struck and received some material damage upon a sunken rock, which he represented as lying at a much greater distance than the above, though nearly in the same line of direction. The cape was so named by Mr. Dixon from the common circumstance of the saint's day on which it was first seen.

HOUSTON STEWART CHANNEL.—From Cape St. James the coast trends nearly N.W. to a well-defined headland, and after rounding it the eastern entrance to Houston Stewart Channel and Rose Harbour will open out, the coast between being much broken, with one round thickly wooded and conspicuous island, and several little islets and rocks along it. At about 4 miles from the entrance there are 90 fathoms, and the water gradually shoals to 20 fathoms to within a mile of it.

In the eastern entrance to this channel, which is about three-quarters of a mile wide, there are 20 fathoms water. Within the northern point (*Forsyth Point*), and on the same side, is a snug bay, bordered by a sandy beach. A quarter of a mile inside Forsyth Point, and a little to the northward of the line of direction of the channel, is a rocky patch with kelp, having 1 fathom on it; a vessel therefore should not haul to the northward too soon after entering. On the southern side are some small wooded islands, here and there fringed with outlying patches of kelp, which latter should always be avoided. At a mile and a quarter W.S.W. from Forsyth Point is a rock (*Trevan Rock*), lying nearly mid-channel, contracting the passage on its northern side to rather less than half a mile.

The southern arm of this channel is about 3 miles long, and three-quarters of a mile wide, with several small islands (the *Shangoi*) at its southern end or entrance from the Pacific. The shores of both sides are bold and densely wooded. A vessel coming from the southward, and wishing to go in by this entrance, when abreast of Cape St. James, should close the land to $1\frac{1}{2}$ mile, and follow it along for about 12 miles, which will lead right into it. By leaving the largest and outer Shangoi Island on the port hand (off the

southern end of which is an extensive ledge of rocks in a S.W. direction), the channel will show itself.

Rose Harbour.—The northern arm of Houston Stewart Strait, or Rose Harbour (which is secure and capacious), runs up in a northerly direction for 3 miles from its junction with Houston Stewart Channel, and is a continuation, in nearly a straight line with the last-mentioned portion of it.

The country around this locality is mountainous and thickly wooded; but the timber is smaller, and less valuable than that in the magnificent forests of Vancouver Island. The soil is poor, but there are indications of copper in different places. The sea otter, the fur of which fetches very high prices in China, are numerous.

About 3 miles to the northward of the eastern entrance to Houston Stewart Channel, and at about 2 miles off the coast, is a ledge of rocks, lying a little above water; the sea breaks violently over them, and for a considerable distance around. From Houston Stewart Channel to Cumshewas Harbour on the eastern side, a distance of about 50 miles, the coast is high, and broken into numerous inlets, with many islets along it, probably affording good harbours. The dotted line, delineating this side of Queen Charlotte Islands on Vancouver's chart, is very erroneous.

Cumshewas Harbour lies nearly E.S.E. and W.N.W., and is reported to be both large and safe. A spit runs off its southern point of entrance nearly two-thirds of the way across to the northern side, on which the sea breaks heavily; the channel in being over a bar with 8 fathoms on it.

SKIDEGATE HARBOUR and CHANNEL.—About 20 miles to the N.W. of Cumshewas is the eastern entrance to Skidegate Harbour and Channel; the intermediate coast being lower and more level than that to the southward, with an extensive bank along it for some miles before coming to Skidegate, with as little as 7 fathoms, when 3 to 4 miles off it. The inlet or entrance to the channel was surveyed by Lieut. Daniel Pander, R.N., in 1866.

Skidegate Harbour is very spacious, and communicates with the Pacific at Cartwright Sound, near Point Buck; the channel, however, is intricate, and only navigable for canoes a portion of the way through. An extensive spit extends from the East side or point of entrance (which is low and woody), in a N.W. direction for about 4 miles, to within 1 mile of Dead-tree Point (the West point of entrance), having from 1 to 2 fathoms on it at low water. A rock lies near its outer extreme, just awash at low water, spring tides. This rock is about 1 mile from Dead-tree Point, but the available passage between is not more than half a mile in width, as the spit extends beyond the rock, and the shore near Dead-tree Point is not bold. The point is called *Dead-tree Point*, from the number of dead trees upon it.

SKIDEGATE.—The village of Skidegate is situated in the bay, off which are the village islands, and consists of many houses fronting the beach, all

of which are very dirty, and smell strongly of fish. The Indians are a finer race than the Vancouver islanders, and although very dirty, are much cleaner in their personal appearance. Some distance from the anchorage, and on the side of a mountain, are large quantities of *coal*, of a description very similar to that discovered at Nannaimo in Vancouver Island.*

The coast between Skidegate and Point Rose is rather low, with dangerous flats running off it, and should be given a berth of at least 6 or 7 miles. *Cape Ball*, nearly 20 miles from Skidegate Bar, is very conspicuous, having a remarkable white cliff on it, with lower cliffs on either side; it cannot be mistaken, for there is no other place like it between Skidegate and Point Rose. Captain McNeil, of the Hudson's Bay Company's service, says, that he found a rock about 6 miles East of Cape Ball, with only 2 fathoms on it.

Rose or Invisible Point, the north-eastern extreme of Queen Charlotte Islands, is low, with a spit running off it in a N.E. direction for nearly 5 miles, and is exceedingly dangerous. With the point bearing W.S.W. about 6 miles, a round-shaped hill, called *Macroon*, will open out clear of the land off which Rose Spit runs; it is about 300 or 400 feet high, but shows out so distinctly as to look almost an island. This part of Dixon Channel, between the land near Rose Spit and Stephens Island on the continental side, is about 20 miles wide, with soundings quite across.

The land from Rose Point to Virago Sound is low, and thickly wooded for some miles from the shore, which has a bank running off it, and should be approached with caution, with the lead constantly going.

MASSET HARBOUR.—Rather more than 20 miles S.W. $\frac{1}{2}$ S. from Point Rose is Masset Harbour, the entrance to which is formed by a low point, with a ledge of rocks half a mile off it covered with kelp, on the western side; and the point of a long spit (*Naiques*) partly dry (the surf usually breaking the whole length of it) on the eastern, the passage between having an extensive bar. With the outer western point bearing W. by N. 1 mile, there are 5 fathoms at low water; from this position the course in is about S. by E. $\frac{1}{2}$ E., the soundings over the bar varying from 5 to 3 fathoms, for about 3 miles, to abreast of a village on the western shore, a little more than a mile from what may be termed the inner or proper entrance to the harbour; the water then suddenly deepens to 9 and 11 fathoms, the channel lying in the direction of the eastern point of what has been called the inner entrance. Just inside, and round this point, is a pretty bay, with a beach, containing the principal village.

* This was found by Capt. Torrens in 1859, but the party were nearly murdered by the Indians. It was examined by Mr. Brown in 1866, and he says: On the North side of Skidegate Bay the tunnel has been driven into the hill in a westerly course, showing the structure of the beds. This tunnel is 112 feet long. The coal has all the character of anthracite, but is altered and metamorphosed by the presence of igneous rock in a remarkable manner.

Edensaw, the chief of the neighbouring tribe, and who is a very intelligent and (when it suits him) valuable person to a stranger navigating this coast, says, that when the Indians wish to go to Skidegate, they pass on to the head of the harbour in their canoes, and walk across a mountainous neck of land.

VIRAGO SOUND.—Between Masset and Virago Sound, which lies about 10 miles to the westward, there is good anchorage in some places, in which a vessel might remain a night, instead of keeping under way, or cruising about with a south-east wind, and the weather thick. The outer anchorage of Virago Sound is sheltered from all winds to the southward of East and West.

The inner harbour of Virago Sound (the native name of which is *Naden*), is very capacious, and sheltered from every wind. For about 1 mile outside the entrance there are several banks, formed probably by the sand, &c., washed down with the ebb, which runs with considerable strength. The rise and fall of the tide is about 13 ft. The narrowest part of the entrance is about half a mile wide, with a deep-water channel, which for the first 2 miles is intricate, and should not be attempted until properly sounded. The western side of one part of the channel, which may be called the narrows, is completely blocked up by rocks.

Parry Channel, called after the late Sir E. Parry, separates North Island (which forms the north-western extremity of the Queen Charlotte Islands) from Graham Island. Ledges of rock run off the southern side for about a mile, but there is a good and clear channel between them and North Island. The tide rushes through this channel, and forms a perfect race. On the South side is Edensaw's Village, from which he intended removing to Virago Sound. Just within the eastern entrance of Parry Channel, and on the South side, is a bay with anchorage in it.

On the South side of North Island, in Parry Channel, is a snug cove, called *Henslung*. It is reported that whalers occasionally anchor in it. At the head of the cove is a sandy beach, with a stream of water running down it. The whole island is thickly wooded.

On the eastern side of North Island there is said to be a very good anchorage in a bay which was formerly often used by the vessels belonging to the old North West company.

Two or three miles to the southward of Parry Channel is an indentation of the coast, which might be taken as its entrance by a vessel coming from the southward—a mistake that might lead to serious consequences, as the whole coast, as far as Point Frederick, appears to contain several open bays, with outlying rocks off each of them.

HIPPA ISLAND* lies 25 miles further to the southward, and is high and

* This island was so named by Dixon, from its being inhabited by a tribe, who fortified

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bold to seaward. This portion of the coast is higher and more broken than the former, the openings appearing deeper, neither does it seem to have so many rocks lying off it. The Indians show some good harbours towards Hippa. When abreast of Hippa Island, *Point Buck*, 30 miles distant, and also Cape Henry, 10 or 12 miles further on, can be seen, the coast presenting the same high and broken appearance as the preceding 25 miles. All the points along this part much resemble *Poin. Buck*, which is rather low and rugged, jutting out from the high land at the back.

This coast of the island, as has been before mentioned, is very uncompletely known; and at a few miles South of Hippa Island Vancouver places the entrance of *Rennell Sound*, so named by Dixon, lat. 53° 28' N. The land appears much broken, and the coast composed of steep mountainous precipices, divided from each other by water. These gradually increase in height in coming southward.

The SKIDEGATE CHANNEL, separating Gaham Island from Moresby Island, lies in lat. 53° 10'. The eastern entrance has been alluded to on page 438. It requires much care in entering, as Mr. Brown says that they knocked the false keel off their schooner in crossing the spit at the entrance.

Point Buck.—This point is on the southern side of the channel (Skidegate Channel), which leads through to Skidegate, having a large high island, *Chalque*, just to the northward of it, and another, much smaller and peaked, standing out clear of the land, at about 3 or 4 miles further to the northward, lying in *Cartwright Sound*, which is formed by Point Buck on the South, and Point Hunter on the North.

PORT KUPER.—Just to the southward of Point Buck, in Englefield Bay, is an opening, leading into a harbour. This bay has Point Buck on the North, and Cape Henry on the South, with Kuper Island (Kennedy Island) in its southern part, having a channel on either side leading into Mitchell Harbour, known also as Gold Harbour.

Inskip Channel.—The northern, or Inskip Channel, which leads round the North side of Kuper Island, was first used by H.M.S. *Virago*, in 1853, its entrance being a few miles South of Point Buck. It is about 8½ miles long, and half a mile wide. A little without it, there are some small islands on either side, but there can be no difficulty in discovering the passage in. In the channel there is no bottom at 60 fathoms, but at the entrance a cast was got with 35 fathoms, on a halibut bank. At a short distance inside the islands, on the port side of the entrance, is a village belonging to the Kil-

themselves precisely in the manner of a *hippa* (e-pah) of the New Zealanders. It is called *Quequatz* by the Indians. Mr. Brown believes that native lead is found in the first inlet above Hippa Island, at a place called *Challem*.

kite tribe. Further in, on the same side, and about $3\frac{1}{2}$ miles up, is a deep opening, and where this and Moore Channel meet are two other openings to harbours, with some small islands lying near them. This channel is no doubt equally as safe as the other.

Moore Channel, the channel on the South side, is named after Moore, late master of H.M.S. *Thetis*, who made a complete survey of both it and Mitchell Harbour whilst in that ship, which was sent to protect British interest in 1852, during the time that a large number of adventurers from California had collected here to dig and search for gold, some of that metal having been discovered by the Indians. This channel, which was always used by the vessels which conveyed these people, is 5 miles long in an E.N.E. and W.S.W. direction, and half a mile broad, the shore on each side being bold of approach, high, and covered with trees down nearly to the water's edge. In mid-channel there is no bottom at 70 fathoms. On the North side, just without the entrance, are some small rocky islets (*Moresby Islands*), and on the South side a few rocks close in shore.

Mitchell or Gold Harbour,* or Skiton, is about $2\frac{1}{2}$ miles deep, and half a mile wide, surrounded by precipitous and densely wooded hills, from 700 to 800 feet in height, and at the head of Thetis Cove is a sandy beach and stream of water. At $1\frac{1}{2}$ mile up the harbour is Sanson Island, a small spot covered with trees, and the ruins of a number of huts. The anchorage lies inside this, in *Thetis Cove*, keeping Sanson Island on the port hand; the passage being a cable wide, with deep water. This cove is completely landlocked, but squalls, frequently accompanied by rain, come over the hills with considerable violence. At upwards of half a mile from the mouth of the harbour, on the starboard side going in, is the Thorn Rock, with only 3 feet on it at low water, lying about a cable's length from the shore; and on the opposite side, not quite at so great a distance from the land, but a little further out, is another rock. These are dangerous to vessels working in or out; but if the wind be fair, and a ship is kept mid-channel, there is nothing to fear.

Douglas Harbour.—At one mile to the westward of Mitchell Harbour, and on the same side of Moore Channel, is the entrance to Douglas Harbour, apparently very similar to the former, from which it is separated by Josling peninsula.

TASSO HARBOUR.—*Cape Hem* *J*, which lies 3 miles from the entrance to

* In 1852, the Hudson's Bay Company despatched a party in the brig *Una*, to examine this place for gold, and Mr. Mitchell, who commanded the ship, collected about 1,000 dollars worth of gold, but the Indians stole it as soon as it was blasted, so the expedition broke up. Again in July, 1859, a party under Mr. Downie attempted to find gold here, but decided that further search was useless.—See Captain Mayne's *British Columbia*, pages 186, 187.

Moore Channel, terminates in a steep slope, with a hummock at the extremity; 18 miles to the southward of this is Tasso Harbour, the intermediate coast being high and rising abruptly from the sea. Its entrance is short and narrow, but the harbour itself is extensive, with very deep water in many places; there is anchorage in it, near some small islands on the port hand going in; it has only been visited by a few of the Hudson's Bay Company's officers. Between Tasso and Cape St. James are other openings, which, according to Indian report, lead into good harbours, the southernmost of which is that leading into Houston Stewart Channel and Rose Harbour. Inside the Shangoi Islands, and close to Houston Stewart Channel, is an opening, called by the natives Louiscoon, and reported to be a good harbour, not unlike Rose Harbour. This coast is also apparently very bold, excepting off the Shangoi Islands, and like the previous 18 miles. The land near Cape St. James has fewer trees on it than that to the northward.

Natives.—The Indians are very fond of travelling, and make voyages of several hundred miles in their canoes, visiting the Russian settlement of Sitka, at the North, and Victoria Harbour on the South.

The possession of slaves is allowed, and there are several of this unfortunate class amongst them; their owners are not held responsible for their manner of treating them, which is frequently very cruel.

Supplies.—Halibut, salmon, herrings, and several other descriptions of fish abound. Immense flocks of wild geese and ducks at times visit the islands. Potatoes grow in abundance in most parts, and thrive exceedingly well, forming an important article of food among the natives. These are all to be bought either for money, strong cotton shirts, cotton dresses, plain cotton, knives, tobacco, mother of pearl jacket-buttons for ornamenting their blankets, or any of the articles commonly bartered among savages.

Tides.—The following brief account of the tides along the North and north-east coast of the islands is given by a Hudson's Bay Company's officer.

The course and strength of the tides are not regular, being greatly influenced by the winds. At full and change they are very rapid. Time of high water about 12^h 30^m.

The flood, coming from the westward round North Island, sets along the Masset shore for Browns Passage, spreading about 15 miles round Point Rose towards Cape Ibbetson, where it meets the flood from the southward, from Skidegate, Banks Island, and Canal de Principe; consequently between Point Rose, Cape Ball, Cape Ibbetson, and thence S.E. 4 or 5 leagues, the tides are very irregular.

The tides between Cape Murray, Point Percy, and Isle de Zayas are the strongest and most irregular, causing a heavy and confused sea, so much so that in bad weather it has the appearance of breakers.

In concluding this account of the coast of the newest of the British colonies, it may be remarked that the wonderful change in its fortunes, and the sudden acquisition of importance to civilization is almost unparalleled. It is, therefore, difficult to keep pace with the progress of a country which till so recent a period was only considered fit to be occupied by the trading posts for the purchase of furs.

The nautical descriptions are, however, tolerably complete, and this is also an evidence of the great progress of the times. The singular and rugged coasts of the region are for the most part most excellently surveyed and described by Captain Richards in the *Vancouver Island Pilot*; when that is wanting the work of Vancouver is our chief guide; and this work has had but scant justice awarded to its great merit.* Whether the country will rise to be the home of a great and populous nation is a question which may fairly left to future controversy.

* Besides the excellent narratives of Captain Mayne and Mr. F. Whympere, which describe many parts of this coast, "The North-west Passage by Land," by Lord Milton and Dr. Cheadle, will, with the others, give a good insight into the early condition of the colonies. "Vancouver Island and British Columbia," by the Rev. Matthew Macfie, F.R.G.S., 1865; "British Columbia and Vancouver Island," by Duncan G. F. Macdonald, E.C., 1862; "Vancouver Island and British Columbia," by Alexander Rattray, M.D., 1862; "Travels in British Columbia," &c., by E. E. Barrett-Lennard, 1862; may be consulted with much advantage. Mr. Sproat's "Scenes and Studies of Savage Life," are very interesting. As he largely employed native labour at his saw mills at Alberni, in Barclay Sound, for many years, he had special opportunities for arriving at some remarkable conclusions. There are numerous detached accounts, among which the Description of Vancouver Island, by Captain W. Colquhoun Grant, F.R.G.S., *Journal Roy. Geo. Soc.* 1857, vol xxxvii, pp. 268—320, may be specially noticed.

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As it is well known, this extensive but comparatively useless region was purchased of the Russian Government by the United States, for the sum of 7,200,000 dollars, *in coin*, the treaty for the transfer being signed on May 28th, 1867. The sum of 200,000 dollars was added to the amount, for the purpose of extinguishing the claims of the Russian-American Fur Company, whose head quarters were at Sitka, and of an ice-company, established in Kodiak, who had special privileges conceded to them.

The Russian-American Company was established under charter from the Emperor Paul, July 8th, 1799; and the extensive territory in question was granted to them to occupy and bring under the dominion of Russia. The Russian Company and the Hudson's Bay Company were thus brought into collision, and the latter experienced considerable loss in their endeavours to prevent this extension of Russian power. But in justice to Russia it must be said that no country had a better claim to the territory; for as early as 1741, Vitus Behring (a Dane in the employment of Russia), and his companion Tschirikoff, had touched on the continent in the lat of 59° and 56°

respectively; the former seeing much of the intervening countries, too, on his return; and by 1763 many other adventurers had penetrated eastward as far as Kodiak—and it must be remembered that no other nation claims to have penetrated further North than lat. 53°. In addition to this, Russia had as gradually improved her knowledge by possession as these discoveries advanced, and this, too, not from any jealousy of other powers interfering, as was the case between Spain, England, and France, to the South. Thus the settlement at Kodiak was formed four years before our countryman Meares purchased, or said he did so, his tract of land in Nootka Sound, and Sitka was founded ten or twelve years before Astoria was.

Notwithstanding this, the Hudson's Bay Company expended considerable sums in the establishment of trading posts on the large River Stikine in lat. 56° 20'. The Russians resented by force this procedure of the company, although England claimed the privilege of navigating the rivers flowing from the interior of the continent to the Pacific, across the line of boundary established under the treaty of 1825. The British Government required redress for this infraction of the treaty; and after negotiation between the two governments and the two chartered companies, it was agreed, in 1839, that from the 1st June, 1840, the Hudson's Bay Company should enjoy for ten years the exclusive use of the continent assigned to Russia by Mr. Canning in 1825, and extending from 54° 40' N. to Cape Spenser, near 58° W., in consideration of the annual payment of 2,000 otter skins to the Russian-American Company. The boundary between the Russian and English possessions was fixed by the convention agreed to by the respective powers, February 28th, 1825. The charter of the Russian-American Company, granted in 1799, was renewed in 1839, when they had thirty-six hunting and fishing establishments.

Sitka, or New Archangel, founded in 1805, was their chief post. Subordinate to it there is a smaller establishment of a similar kind at Alaska, which supplies one post in Bristol Bay, and three posts in Cook Inlet, all connected with minor stations in the interior. Another station in Norton Sound has its own inland dependencies. The whole of the territory was divided into six agencies, each controlled by the governor-general. The inhabitants of the Kurile and Aleutian Islands, and those of the large island of Kodiak, were regarded as the immediate subjects of the Russian Company, in whose service every man between 18 and 50 may be required to pass at least three years. The natives of the country adjacent to Cook Inlet and Prince William Sound also paid a tax to the company, in furs and skins. The other aborigines in the Russian territory were not allowed to trade with any people but those of the Russian Company.

In 1836 the number of Russians in the territory of the company was 730; of native subjects, 1,442 creoles and about 11,000 aborigines of the Kurile, Aleutian, and Kodiak Islands.

The political troubles in which Russia was involved a few years since, and the probable unprofitable nature of this, their distant possession, led the way to the quiet transfer of this immense region.* Under its new masters some of its resources will most probably be further developed, but the real value of the territory was the subject of much remark and controversy at the time of the purchase. So little was really known of Wal-russia that most vague statements were made respecting it. And as the new regime is of such recent establishment but little can be said here of the social condition of its inhabitants, or of its value to mankind in general.

The one prominent feature which is of most interest in this work is the peculiarity of its climate. In the first edition of this work (1850) the great stream which, like another Atlantic Gulf Stream, passes swiftly along the Japanese Archipelago, was traced for the first time, step by step, up to these shores, and the circulatory system of the North Pacific was shown to be analogous to that of the other oceans. Unlike the North Atlantic, the whole of this eastward drift is carried on to the American coast (as explained in the special Chapter hereafter), one portion along the Aleutian Islands, the other towards Vancouver Island and California. The insignificant portion, which passes through Behring Straits, does not affect the great question. This immense E.N.E. drift brings to the shores of Alaska an enormous quantity of water that is warmer than is due to the latitude. The one great result of this is the wonderful development of animal life, which is the distinguishing feature of the ocean washing it. *It is the greatest fishery in the world.* The accumulated development of ocean-life seems to be drifted on to the coast and into its intricate fiords, as is the case, but in a minor degree, with the Atlantic and the great fishing banks of the Loffoten Islands and the Coast of Norway.

The result of this unbounded supply of ocean-food is that the rivers and fiords teem with salmon to such an extent, that the quantity seems to be incredible, were it not for the universal testimony of all who come here. In the open sea, cod, halibut, and an infinite variety of fish, are to be caught in unbounded quantities. Upon these fish and mollusca, the sea otter by land, and the whale in the sea exist, and are, at present, the chief objects of profit.

The climate of the region, too, is subject entirely to this ocean influence. The prevalent S.W. winds, blowing over such a wide area of warmer ocean, brings to the land, and especially near the sea, a vast accumulation of

* The history of the negotiation, and the steps which led to it, are exhaustively related in a "speech," by the Hon. Charles Sumner, before Congress, Washington, 1867. This is comprised in a closely printed pamphlet, of 96 columns! and gives a resumé of the whole subject as far as was then known.

aqueous vapour, which, while it ameliorates the climate, and by its humidity causes vegetation to be of most gigantic growth, makes the climate of Alaska to be so moist, that cultivation would seem to be hopeless. The following summary of *fourteen years* observations at the Imperial Observatory at Sitka will plainly show this relation of temperature and rainfall.

	Temp. Fahr.	Rain. Inches.
Spring (March—May)	41°.3	14.0
Summer (June—August)	54°.3	16.4
Autumn (September—November)	44°.2	30.8
Winter (December—February)	31°.9	22.9
Mean ..	42°.9	Total .. 83.1

The greatest rainfall was 96 inches in 1850; least 58.6 inches in 1861. The yearly average of days upon which rain, snow, and hail fell, or on which fog prevailed, for fourteen years, was *two hundred and forty-five*. These results are from hourly observations.

At Ounalaska, according to Bishop Benjaminoff, the mean spring temperature was 33°.9, summer 49°.6, autumn 37°.5, winter 30°.1, mean for the year 37°.8, or 5°.1 below that of Sitka.

The harbour of Sitka and the adjacent harbours never freeze, and the land ice is unfit for the Californian market, which is supplied from Kodiak. Here the ice forms from 15 to 25 inches each year, so that it is not thicker than that of Boston, U.S., although it is 900 geographical miles further North! a wonderful evidence of ocean climate. Of the whaling grounds we will briefly speak in the next Chapter.* Of its forests, its coral fields and gold regions, we need not say anything—all these matters are yet in their infancy.

The population of the territory, as reported by the military commander to be, 2,000 whites and 60,000 half breeds and Indians; but this latter estimate must be very crude. Sitka is the port of entry. The military force (1868) consisted of infantry and artillery, sufficient to garrison six military posts.

The laws of the United States relating to customs, commerce, and navigation, and the establishment of a collection district at Alaska, were extended to the territory by the Act No. 125 of the Second Session of the 40th Congress, passed July 27th, 1868. By the same Act the killing of fur-bearing animals is prohibited, except under regulations prescribed by the Secretary

* When the representatives of the Federal Government went to Sitka to receive the transfer of the territory, a body of scientific men accompanied them, and the result of some of their investigations, as given by Professor Davidson, is given in the proceedings of the California Academy of Natural Sciences, San Francisco, 1867.

of the U.S. Treasury. By order of General Halleck, Aug. 13, 1868, the military district is attached to California.

The character of the country, and its trade, &c., will be gathered from the previous remarks and the subsequent descriptions. These are not always perfect. A portion of the interior sounds were explored and surveyed by Vancouver, doubtless with his usual accuracy, but of course this occurred before it was colonized by the Russian Company. A Russian chart was published in 1853, which gave many additional details, especially of the western face of the Sitka Archipelago, which was re-surveyed by them.

The KOLOSCHENSK ARCHIPELAGO of the Russians, is the extensive group of islands which lie between the entrance of the Portland Canal, the boundary of the Territory, and the northern part of the Sitka Islands. Its main features were well delineated by Vancouver's survey in 1792, but in many parts, especially of that which has become the principal part, the Sitka Group, the cursory examination he made is somewhat defective. The Russian officers have made us better acquainted with it, and the King George III. Archipelago of our illustrious navigator is now separated into four or more large islands. The Russian designation is derived from the Indian tribes who inhabit them. These Koloschians, or Kaloshes, have been known in British Columbia as Stikines, and they speak the same language, or at least a dialect of it, as the natives of Vancouver Island and the adjacent continent. Their number is assumed as from 12,000 to 15,000, and they are separated into several families or tribes. Although very much has been done by the Russians in bringing them into a better condition than the primitive savages they were, they must not be trusted.

The PORTLAND CANAL, forming the boundary, has been described before, pages 434—435. *Cape Fox* forms the N.W. point of the approaches to it.

TONGASS, the southernmost of the new military posts established by the United States on their new territory, is on a small island, one of the Wales Island group, which form the North side of the entrance to the Portland Canal, at 10 miles E. by N. from Cape Fox, in about lat. $54^{\circ} 42' N.$, long. $130^{\circ} 29' W.$, and opposite to Fort Simpson, which is distant only 4 or 5 miles to the S.E. The fort, which is garrisoned by one company, is of the usual description, and the primeval forest has had to be cleared for the purpose of forming the post. Fish, as everywhere besides, is most abundant. The Tongass Indians, a small tribe of about 500 people, inhabited these islands.

A rock, marked on the chart as the *Pointers*, lies in the entrance of the Portland Inlet, at 3 miles West from the South point of Birnie Island, at the entrance to Port Simpson.

From Cape Fox the coast takes a rounding direction N.W. by W. 4 miles,
North Pacific.

and then N. by W. $\frac{1}{4}$ W. near 7 miles further, to a projecting point called *Foggy Cape*, the coast being very rocky and dangerous.

North of *Foggy Cape* is a large bay filled with a labyrinth of small islands, rocks, and shoals, the north-westernmost and largest being N. by W. $\frac{3}{4}$ W. nearly a league distant. Cape Fox on the East, and Cape Northumberland on the West, bearing E. by S. and W. by N. 5 leagues apart, form the southern entrance to the Canal de Revilla Gigedo of Caamano, hereafter noticed.

Four miles to the northward of the island above mentioned is the entrance to the *Boca de Quadra*, which is almost rendered inaccessible by islets and rocks. The inlet first takes a direction of N.E. $\frac{1}{2}$ E., to a point 7 miles within the entrance, whence the shores become less elevated, and the inlet takes a S.S.E. direction for 5 miles, and then N.N.E. $\frac{1}{4}$ E. for $4\frac{1}{2}$ leagues to its head, in lat. $55^{\circ} 9'$, a small border of low land, through which flow two rivulets. The sides of this canal are nearly straight, firm, and compact, composed of high, steep, rocky cliffs, covered with wood. Near the entrance, in the Revilla Gigedo Canal, is an islet called by *Vancouver Slate Islet*, a prodigious mass of this stone differing from any other about here. N. $\frac{3}{4}$ W. 4 miles from this is *Point Sykes*, and N.W. $\frac{1}{4}$ W. 5 miles, is *Point Alava*, between which points is the entrance to Behm Canal.

BEHM CANAL, so named after Major Behm, is one of those extensive and singular arms which abound on this forbidding and inhospitable coast. It runs northward for 55 miles, then westwardly and southwardly, encircling the large island of Revilla Gigedo, and this is separated on the S.W. by the strait of the same name from Gravina Island.

From *Point Sykes*, the S.E. point of the entrance, the South shore runs N.E. $\frac{3}{4}$ N. 10 miles to *Point Nelson*, the inlet being from 2 to 4 miles wide. Eastward of *Point Nelson* an inlet takes an East and N.E. direction for 10 miles, terminating in the usual manner. The surrounding country consists of a huge mass of steep, barren, rocky mountains, destitute of soil, the summits covered with perpetual snow. The shores are nearly perpendicular cliffs rising from the water's edge. The N.E. point of this inlet is *Point Trollope*, $4\frac{1}{2}$ miles from *Point Nelson*. Northward of *Point Trollope* are two long narrow islands on the East side, forming a narrow channel 7 miles long inside of them. Off the N.W. point of the northernmost of these, bearing N.N.W. nearly a league distant, is a very remarkable rock, named by *Vancouver* the *New Eddystone*, from its resemblance to the celebrated lighthouse and rock. Its circumference at its base is about 50 yards, standing perpendicularly on a surface of fine dark-coloured sand. Its surface is uneven, and its diameter regularly decreases to a few feet at its apex. Its height was found to be above 250 feet, lat. $55^{\circ} 29'$.

On the East shore of the canal, a league above the *New Eddystone*, is an unimportant arm, 2 leagues in depth. The coast beyond this is straight and

compact, trending N. $\frac{1}{2}$ W. 9 miles to *Walker Cove*, an inlet extending 2 leagues E.N.E.. The main inlet extends in a N.W. by N. direction from Walker Cove. The water is of a very light colour, not very salt, and the interior country, on the Island of *Revilla Gigedo*, rises into rugged mountains, little inferior in height to those on the eastern side. Proceeding northward, the canal takes a more westerly direction to *Fitzgibbon Point* on the East side, in lat. $55^{\circ} 56'$; and the opposite point on the island is called *Point Whaley*.

Burrough Bay extends N.E. from Point Fitzgibbon about 2 leagues, where it is terminated by low land, through which three or four small rivulets appear to flow over a bank of mud stretching from the head of the arm, and reaching from side to side, on which was lodged a quantity of drift wood. When Vancouver was here, August 11th, 1793, he found the water perfectly fresh, and the whole surface of the bay strewn over with salmon, either dead or in the last stages of existence. They were all small, of one sort, and called by him hunchbacked salmon, from a sort of excrescence rising along the backs of the male fish. In all parts of the inlet, particularly in the arms, and in every run of fresh water, vast numbers of these fish were seen, but all in a sickly condition. If any just conclusion could be drawn from the immense numbers found dead, not only in the water, but lodged on the shores below high water mark, it would seem that their death takes place immediately after spawning, for the purpose of which they ascend these inlets.

From the mouth of Burrough Bay, the main inlet takes an irregular S.W. $\frac{1}{2}$ W. direction, to a point on the North shore, 4 miles from Point Whaley, named *Point Lees*. Beyond Point Lees the North shore of the principal channel is formed by *Bell Island*, which is about 2 leagues long in a N.E. and S.W. direction.

The point on the South shore, beyond the West point of Bell Island, is in lat. $55^{\circ} 50'$, long. $130^{\circ} 41'$ (Vancouver, vol. ii, p. 357); and here the channel turns sharp to the South, and widens in that direction. On the opposite side of the canal is an inlet extending in a N.W. $\frac{1}{2}$ W. direction, for about 4 miles. South of this inlet is a large bay, terminating in a sandy beach nearly all round. The interior country is not very high, particularly westward, where a low wooded country extends as far as the eye can reach.

Port Stewart, named after one of the mates of Vancouver's ship, is to the southward of this. Its South point of entrance is in lat. $55^{\circ} 38' 15''$ N., long. $131^{\circ} 47' W.$; variation, $28^{\circ} 30' E.$ (1793). Here Vancouver remained with his vessel in August and September, 1793. He found it a small but convenient bay, secured by several islets before it, from the wind in all directions.

It is formed, as before stated, by a bay in the land, having several islets and rocks lying before it; within these, from the South point of its entrance,

it takes a course of N.N.W. $\frac{1}{2}$ W., about half a league in length and three-quarters of a mile in breadth. In this space it affords good and secure anchorage, from 4 to 18 fathoms water, good holding ground. Towards its head are two very snug coves or basins, one of which is a continuation of the port, the other formed by an indent in the land. The best passage into Port Stewart is between the southernmost isle and the main land; this is perfectly free from any obstruction, with soundings from 4 fathoms at the side to 11 fathoms in the middle.

The eastern shore of the canal, southward of the point where it assumes a southerly direction, is much broken and intersected with arms; and opposite to Port Stewart is a cove near which Vancouver was attacked by Indians, in which two of his men were severely wounded; hence he called it *Traitor's Cove*, and a point to the South on which he landed, in lat. $55^{\circ} 37'$, *Escape Point*.

Cape Caamano is the South point of the peninsula, dividing the arm from Clarence Strait. It is in lat. $55^{\circ} 29'$, long. $131^{\circ} 54'$. It was so called after the Spanish commander who first delineated (though imperfectly) these shores.

On the opposite side of the channel, the westernmost point of the island of Revilla Gigedo, is called *Point Higgins*, after the then president of Chile, Senr. Higgins de Vallenar, and this latter name is applied to the North point of the Island Gravina, S. $\frac{1}{2}$ W. 2 miles from Point Higgins. From *Point Vallenar* lies a ledge of rocks, parts of which are only visible at low tide. *Beaton Island* lies to the northward of Point Higgins, against the eastern coast.

The **CANAL REVILLA GIGEDO**, of Señor Caamano, separates, as before stated, the Island, and other Islands, of Gravina from the island of its name and the main land. It runs south-westward from between Points Higgins and Vallenar to between Foggy and Northumberland Capes, described previously. A *sunken rock* is marked on the eastern side of its southern entrance. It was not explored by Vancouver.

DUKE of CLARENCE STRAIT separates the Prince of Wales Archipelago on the West from the islands we have been describing on the South, and from the Duke of York and other islands northward, and is probably the opening distinguished in Caamano's chart as the "Estrecho del Almirante Fuentes, y Entrada de Nostra Señr. del Carmin."

Cape Northumberland is the southernmost point of the Gravina Islands. Off Cape Northumberland are several clusters of rocks, the bearings of the principal of which, from a tolerably high round island lying South from the cape, are as follow: the outermost to the N.W., N.W. by W., $3\frac{1}{2}$ miles; the south-westernmost, W.S.W. $4\frac{1}{2}$ miles; the southernmost, which are the most distant, South, $6\frac{1}{2}$ miles; and the south-easternmost, S.E. $\frac{1}{2}$ E. 5 miles distant; within some of these the intermediate spaces are occupied by an

immense number of rocks and breakers. The southernmost is a round lump of barren rock, always above water. On the chart two other reefs are marked, the positions of which are doubtful. The one is called the *Devil's Ridge*, and bears 13 miles South of Cape Northumberland; the other is 15 miles to S.S.W. of the same cape.

Point Percy lies N.W. by W. $\frac{3}{4}$ W. 9 miles from Cape Northumberland. It is the western extremity of a long, narrow cluster of low islands, extending about 5 miles in an E.N.E. direction, nearly uniting to the eastern shore, which is much broken North and South of them. Between this point and Cape Northumberland are several clusters of dangerous rocks, lying in all directions, a considerable distance from shore.

Point Davison bears N. $\frac{1}{2}$ E. 4 miles from Point Percy, and is in lat. $55^{\circ} 0\frac{1}{2}'$. The coast then runs North towards an opening about 2 miles wide, appearing to divide Gravina Island. In it are innumerable rocks and rocky islets. Northward of this the shores trend N.N.W. 5 miles, and then about N. by W. 6 leagues to Point Vallenar. The shores of the Gravina Islands are of moderate height, and covered with wood.

The southern entrance to the Duke of Clarence Strait lies, as before stated, between Cape Northumberland on the East, and *Cape de Chacon* on the West. This latter cape is the S.W. point of the Prince of Wales Archipelago, and bears W.S.W. from the former, 8 or 9 leagues off, lat. $54^{\circ} 43'$, long. $131^{\circ} 56'$.

The first considerable opening on the western shore of the strait, North of Cape de Chacon, is *Moirs Sound*. It takes a south-westerly direction. From this sound the western shore takes a direction nearly North, and forms some bays; the largest of these, situated in lat. $55^{\circ} 8'$, has, in and before it, several smaller islets; the outermost is by far the largest; and as it in many points of view resembled a wedge, it was called *Wedge Island*; off its South point lies a ledge of dangerous rocks. Nine miles North of Wedge Island is a projecting point, in lat. $55^{\circ} 16\frac{1}{2}'$, and to the West of this is *Cholmondeley Sound*, which extends to the southward, divided into several branches. A small island lies to the N.W. of the entrance. *Point Grindall* bears from Cape Caamano S.W. by W. 4 or 5 miles distant, with some rocks and breakers extending about a mile from it.

On the eastern side of the entrance to Cholmondeley Sound is, or was, a Russian settlement, *Chasintseff*.

From Cape Caamano to Point Le Mesurier the coast first bears N.W. by W. near 2 leagues, and then N.N.W. *Point Le Mesurier* projects from the main land to the westward, and has some islets and rocks extending about a mile from it. Opposite to Point Le Mesurier is *Point Onslow*, N.N.W. $\frac{3}{4}$ W. $5\frac{1}{2}$ miles distant, and between these points is the entrance of an inlet, nearly as extensive as the one it enters, named *Prince Ernest Sound* (after the Duke of Cumberland, afterwards King of Hanover). Point Onslow is the

South extreme of the island or islands forming the Duke of York Archipelago.

The continental shore from Point Le Mesurier trends N.N.E. $\frac{1}{2}$ E. for about 4 leagues, indented with bays. The opposite shores then incline more to the eastward from this point; and to the northward of it is the South point of an island extending N.N.W. $\frac{1}{2}$ W. 5 miles; but it allows a tolerably good channel inside it. N. by W. $\frac{1}{2}$ W. from the bay within the island, 2 $\frac{1}{2}$ leagues, brings you to *Point Warde*, in lat. $56^{\circ} 9'$. The western shore is irregular in its direction, and much broken; opposite the island it is 6 miles across. From Point Warde the coast takes a sharp turn N.E. by E. $\frac{1}{2}$ E. 4 miles, to a point where the channel divides into two branches; the easternmost extends eastward about 3 leagues, terminating in the usual way, and named *Bradfield Canal*. The main branch extends in a N.N.W. direction, 3 leagues to a point in lat. $56^{\circ} 20'$. Here it again divides into two branches; the main channel, before which lie several rocks and small islets, is not more than a quarter of a mile wide, extending irregularly to the N.W. and S.W., forming a passage about a league long to *Point Madan*, stretching to the N.N.W. $\frac{1}{2}$ W. In this direction it proceeds about 16 miles to a very conspicuous point, in lat. $56^{\circ} 34'$, named *Point Highfield*, where the channel again appears to divide into two branches to the N.N.W. and W. It is the northernmost point of Wrangel Island.

Etoline Harbour is on the western side of the North end of Wrangel Island, 3 miles South of Highfield Point, lat. $56^{\circ} 31' N.$, long. $132^{\circ} 20' W.$

WRANGEL, one of the six military posts of the United States, is pleasantly situated in the bight of *Etoline Harbour*. The scenery around is very fine. The buildings erected are most substantial, and there is a large Indian village in the immediate vicinity.

The apparent opening to the northward of Point Highfield is entirely closed by a shoal extending across it from *Point Rothsay* on the East or continental shore, and *Point Blaquiere* on the opposite side, on the edge of which are only 6 and 9 feet water. To the South of this shoal, and in its immediate vicinity, are four small islands and two or three islets; one of the former upon the shoal, and the others at the distance of $1\frac{1}{2}$ league from Point Highfield, extend to the West and S.W. of it. This shoal is very steep-to, and, by its connection with the adjoining land, it may be said to make the latter form a portion of the continent.

The **RIVER STIKINE**, or *Stachine*, or *Pelly River*, enters this part of the inland navigation, and has formed the shoal above mentioned, which thus closes its entrance, but it is probable that local enterprise and knowledge will show a useful channel into it. When over the bar it can be ascended for more than 30 miles by a steamer.

Fort Stikine, near the mouth of the river, was originally founded by the Russian-American Company, and in 1842 was transferred to the Hudson's

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Bay Company, on a lease of 10 years. The establishment, of which the site had not been well selected, was situated on a peninsula barely large enough for the necessary buildings; while the tide, by overflowing the isthmus at high water, rendered any artificial extension of the premises almost impracticable; and the slime that was periodically deposited by the receding sea was aided by the putridity and filth of the native villages in the neighbourhood in oppressing the atmosphere with a most nauseous perfume. The harbour, moreover, was so narrow, that a vessel of 100 tons, instead of swinging at anchor, was under the necessity of mooring stem and stern; and the supply of fresh water was brought by a wooden aqueduct, which the savages might at any time destroy, from a stream about 200 yards distant.

The North shore of the principal arm leading from the mouth of the Stikine River now takes a direction of S.W. $\frac{1}{2}$ S. for 14 miles to *Point Howe*. The shores are indented with small bays, with some small islets; the opposite, or South shore, is about a league distant; and, to the westward of *Point Craig*, lying from Point Hood S.E. by E. 2 leagues, the shore appears firm and compact; to the E. of it, it is much broken and divided. From Point Howe the shore rounds in a westerly direction to *Point Alexander*. This point is the easternmost of the entrance to *Duncan Canal*, which stretches irregularly North and N.W. to its termination in a shallow bay, bounded to the North by a low sandy flat, in lat. $56^{\circ} 58'$. *Point Mitchell* forms the S.W. point of the canal, and is opposite the opening of the southern branch of the Duke of Clarence Strait, the description of which we will resume from the point where Prince Ernest Sound diverges from it.

Point Onslow, as before mentioned, is the North point of the entrance of Prince Ernest Sound; and, from this to *Point Stanhope*, the next projection on the eastern shore of the channel, the distance is 15 miles. The coast then extends N. $\frac{1}{2}$ W., about 10 miles, to *Point Harrington*. Three miles and a half southward of Point Harrington is a small island, on the North side of which is tolerable anchorage, close under the shores of Etoline Island, in *Steamer Bay*.

Point Nesbitt, the South point of Zarembo Island, is in lat. $56^{\circ} 15'$, and bears from Point Harrington N.W. about 2 leagues, the interval forming the opening to Stachinski Inlet bearing to the N.E., towards the entrance of the Stachine or Stikine River. Off Point Harrington, and nearly in mid-channel, is a cluster of low rocks; and also off Point Nesbitt, extending southward from the point, is a ledge. These seem very dangerous, as most of them are only visible at low water.

Bushy Island, which lies in the channel to the northward of Point Nesbitt, is about 2 miles long, having from its shores, on both sides, some detached rocks, but admitting between it and the eastern shore a navigable channel, extending northward to between *Point Macnamara* on the East, and *Point Colpoys* on the West; this bears West, $1\frac{1}{2}$ league from the former.

Here the channel enters from the north-eastward, as before described, and bears to the westward and S.S.W. to the ocean. Point Mitchell, the S.W. point of Kuprianoff Island, on the S.W. side of the entrance to Duncan Canal, is the point on the North shore opposite to Point Colpoys, and is 8 miles distant. The northern shore of this branch of the strait extends a little to the southward of West to *Point Barrie*, a distance of 18 miles. In that space are innumerable rocks; and nearly midway between the two points there is a large bay.

The southern shore, which forms the North coast of the Prince of Wales Archipelago, and the distance between Point Colpoys and Point Baker, its East and West extreme, is 17 miles. Just to the south-westward of Point Baker is an excellent harbour, Port Protection, which was a haven which afforded Vancouver an asylum when he little expected it, amidst impending dangers, in September, 1793.

PORT PROTECTION will be most readily found by attending to the following directions. It is situated at the N.W. extremity of the Prince of Wales Archipelago; its southern extreme comprises the base of a very remarkable barren peaked mountain, named Mount Calder. This is conspicuous in many points of view. Point Baker, in lat. $56^{\circ} 20' 30''$, long. $133^{\circ} 33'$, on an islet close to the shore, forms the N.E. point of entrance, from whence the opposite point lies S.S.W. $\frac{1}{4}$ W. three-quarters of a mile distant; the channel is good, and free to enter, yet there is one lurking rock, visible only at low tide, lying in a direction from Point Baker S. by E. $\frac{1}{4}$ E. 3 cables' lengths distant; it is clear all round.

The harbour takes a general direction from its entrance S.E. by S. $\frac{1}{4}$ S. for $2\frac{1}{2}$ miles, and its navigable extent is from 5 to 3 cables' lengths in width, beyond which it terminates in small shallow coves. The depth is rather irregular, from 30 to 50 fathoms. The tides appear to be irregular, but come from the South, and it is high water $7^h 40^m$ after the moon passes the meridian.

Points Baker and Barrie form, as before stated, the western extremes of the branch of the Duke of Clarence Strait, which trends East and West. Westward of this the strait takes a southerly direction to the Pacific, and the western shore of this portion is formed by the southern end of an island called *Kou Island* by the Russians, which is singularly intersected by deep bays and inlets, and the shores of which are bestrewn with innumerable rocks, with a narrow channel separating it from the main, so full of rocks and dangers that it certainly is not navigable.

The western shore of the strait bears from Point Barrie in a West direction, but between is *Conclusion Island*, about $3\frac{1}{2}$ miles long, N.W. and S.E. Between Point Baker and Conclusion Island, distant from the former 4 miles, is a smaller island, low, and about a mile long North and South, with a ledge of very dangerous rocks extending from its South

point. From hence the coast takes an irregular direction about S. by E. to a point in lat. $56^{\circ} 17'$, forming the N.E. point of entrance into Port Beauclerc.

Port Beauclerc is of easy access and egress, free from every obstruction but such as are sufficiently evident to be avoided. The opposite point of entrance lies West 2 miles distant; it extends N.W. $4\frac{1}{2}$ miles, and S.W. 2 miles, from the points of entrance. The surrounding shores are in general moderately elevated, and well covered with wood.

Point Amelius lies S.E. by S. $\frac{1}{4}$ S. about a league from the entrance of Port Beauclerc, and South of it the coast forms a bay about a league to the westward, and thence it takes a more southerly direction, about 7 miles, to *Point St. Albans*, which is a low rocky point, in lat. $56^{\circ} 7'$, long. $133^{\circ} 55'$. Off this portion of the coast, islets, rocks, and breakers extend about a league.

Afleek Canal extends to the N. by W. 15 miles, immediately to the westward of Point St. Albans. Its eastern shore has rocks off it for the first league and a half, and then becomes straight and compact to its termination in some low land, through which flow some streams of fresh water. The eastern sides of the canal are mountainous, but not so steep. The western side is moderately elevated.

CAPE DECISION, the South extreme of Kou Island, is a very conspicuous promontory, extending in a South direction into the ocean, in lat. $56^{\circ} 2'$, long. $134^{\circ} 3'$. Southward of the cape are some islands; the largest, *Coronation Island*, is about 7 leagues in circuit. From the N.E. point of this island, which bears S. by E. 4 miles from Cape Decision, is a range of rocky islets extending to the North, within half a league from the main land.

Cape Pole is the promontory on the western shore of the Prince of Wales Archipelago, which forms, with Cape Decision, the entrance to the Duke of Clarence Strait. They bear W. by S. $\frac{1}{4}$ S., and E. by N. $\frac{1}{4}$ N., 11 miles asunder. Off Cape Pole is *Warren Island*; it is high, and between it and the cape many lurking rocks were observed. To the southward of it also are three clusters of very dangerous rocks, the first lying from its S.W. point S. by E. $\frac{1}{4}$ E. $3\frac{1}{2}$ miles distant; the second, South, 6 miles, and a small islet lying from them S.E. at half a league distant; and the third cluster lies off the S.E. point of the island, which from its N.W. point lies S.E. $\frac{1}{4}$ E. 4 miles, from whence those rocks lie in a direction S.E. by S. $\frac{1}{4}$ S. about 4 miles distant. Nearly in mid-channel, between Warren and Coronation Islands, there was no bottom at 120 fathoms.

Although the navigation of Clarence Strait may be free from danger, yet it ought not to be used without much circumspection, as several rocks are marked on the Russian chart.

From Cape Pole the western shore of the Archipelago trends very irregularly to the S.E., and at 6 or 7 miles from the cape is the entrance to *Sachine*

Strait, a narrow channel which, running in the same direction for more than 15 miles, insulates what was thought to be the main land of the chief island, and terminates in *Tonock Bay*. The outer coast then trends to the South for 20 miles to Cape Addington.

Cape Addington, which appears to be the next most remarkable promontory to the South of Cape Pole, was so named by Vancouver, after the Speaker of the House of Commons. It is very conspicuous, and is in lat. $55^{\circ} 27'$, long. $133^{\circ} 48'$.

Port Bucareli, a very extensive inland sea, lies at the back of and to the southward of Cape Addington. It was discovered by Ayala and Quadra, the two Spanish navigators. They anchored here on August 16th, 1775, and named it Puerto del Baylio Bucareli, in honour of the Mexican viceroy. It seems also to be the same as Sea Otter Sound of Meares. It is formed by several islands. They here took possession, in the name of his Catholic Majesty, of all the country they saw, and all they did not see. The unfortunate La Pérouse also explored it.

Cape San Bartolomé, at the S.W. point of the entrance of this inland sea, and is in lat. $55^{\circ} 12\frac{1}{2}'$, long. $133^{\circ} 36'$, and is the South extremity of a long, narrow peninsula, extending in a southerly direction, with some islets off it; it is probably the Cape Barnett of Meares.

The entrance lies between Cape San Bartolomé and the West coast of Suemez Island, $3\frac{1}{2}$ miles apart. There is anchorage in a bay on the N.W. side of Suemez Island, at 8 miles within the entrance. To the N.E. of this it opens out into a large bay, with many islands. On the N.E. side of this bay is a settlement, called *Kliavakhan*, and to the S.E. it leads to Tlevack Strait, which enters the N.W. part of Cordova Bay.

From Suemez Island the S.W. coast of the Archipelago extends to the S.E. for 25 miles to *Port Bazan*, which is separated into two arms by an island. The anchorage is in the southern arm. *Cape Muzon*, the S.W. point of the Archipelago, is 12 miles to the E.S.E., and to the East of this cape is the entrance to *Kaigan Harbour*. To the eastward of this, at the South end of the island, is the extensive bay called *Port Cordova* in the Spanish charts, and is the Port Meares of that commander.

The Rasa Isle, or the *Wolf Rock*, lying off the mouth of Port Bucareli, is one of the most dangerous impediments to navigation on the exterior coast, and from these circumstances it obtained from Vancouver its latter name. It is a very low, flat, rocky islet, surrounded by rocks and breakers that extend some distance from it: it lies 14 miles S. 21° E. from Cape St. Bartolomé, 12 miles from the nearest point of the contiguous shore, and 3 leagues N. 11° E. from San Carlos Island. It was seen by the Spaniards in 1775, who called it *Rasa*, or low. By Captain Douglas it was called Forrester Island in 1786.

San Carlos is a small high island; its South point is in lat. $54^{\circ} 48'$, long.

133° 32'. The channel between it and the Wolf Rock appears to be free from interruption. It was discovered by Ayala and Quadra, in August, 1775, and by them named San Carlos Island. It is called *Douglas Island* by Meares and others, and *Forrester Island* by Vancouver, but its real name must be that first applied by the Spaniards. It is very high, covered with verdure, and visible 16 or 17 leagues off.

We now return to the northward.

Between Cape Decision and Cape Ommaney, which latter is in lat. 56° 10', long. 134° 33½', and 16 miles distant from the former, is Christian Sound, and this forms the southern entrance to a very extensive inland navigation, extending in a remarkably straight direction to the N.W. through upwards of 3° of latitude, separating a series of large islands from the continent of America. The principal of these are Chatham Strait, leading immediately from Christian Sound to the northward; Prince Frederick Sound, diverging eastward from it; and Stephens Passage, which branches northward out of the latter. These principal arms insulate the Sitka Islands (or King George the Third Archipelago), Admiralty Island, and numerous subordinate islands, which will be described in due order, commencing with the continental shores.

CHRISTIAN SOUND is the passage between Cape Ommaney and Cape Decision. It is noticed again hereafter. From Cape Decision the coast trends N.N.W. ¾ W. 3 leagues, and then N. by W. the same distance, to the North point of *Port Malmesbury*. This is about 2 leagues deep N.E. and then S.S.E., and has some islets and rocks on it; notwithstanding which it affords very excellent shelter in from 17 to 34 and 12 fathoms water, and is conveniently situated towards the ocean. The North point, called *Point Harris* or *Garns*, is rendered very remarkable by its being a projecting point, on which is a single hill, appearing from many points of view like an island, with an islet and some rocks extending near a mile to the S.W. of it. Seven miles further northward is the South point of a large bay full of innumerable islets and rocks. Its N.W. point of entrance, *Point Ellis*, is in lat. 56° 31', long. 134° 15'. *Point Sullivan*, which is the next point in the main inlet to the northward, is in lat. 56° 38', and East of this, also, is an inlet full of rocks and islets. From Point Sullivan the shores to the northward are less rocky, taking a direction of N. ¾ W. 13 miles, to Point Kingsmill, which is conspicuous.

Point Kingsmill is the S.W. point of Prince Frederick Sound, the opposite point of entrance being Point Gardner, the S.W. extreme of Admiralty Island. This sound extends to the N.E. and East.

PRINCE FREDERICK SOUND.—From Point Kingsmill to Point Cornwallis the bearing and distance are N.E. ¼ E. 6½ miles, the space between being occupied by two bays, each taking a south-easterly direction. To the eastward of Point Cornwallis is *Kiku Strait*, the West shore of which trends

first E.S.E. 9 miles, and then S.S.E. $\frac{1}{2}$ E. for $7\frac{1}{2}$ miles further. From this *Port Camden*, an inlet about half a league wide, runs in a S.S.W. direction, 8 miles, to within 2 miles of the head of the inlet N.E. of Point Ellis, previously mentioned. The shores of Port Camden are pretty free from islets and rocks, but those to the N.W. of it are lined with them, and render the approaching of it extremely dangerous, and its southern extension is perfectly unnavigable for shipping.

The peninsula of Kou Island, which is connected with the more eastern land by the last-mentioned narrow isthmus, is by no means so high or mountainous as the land composing the adjacent countries on the opposite or north-eastern side of the sound, which at no great distance consists of very lofty, rugged, dreary, barren mountains, covered with ice and snow.

Point Macartney forms the N.E. point of Kiku Strait. It is a large, rounding, though not lofty promontory, in which are several small open bays, and near it several detached rocks. From hence the shore of *Kuprianoff Island* trends N. by E. $\frac{1}{2}$ E. about a league, where the width of the sound is about 7 miles across in a N.W. direction, to Point Nepean. From this station N.N.E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles distant, lies a small island with patches of rock, from this point reaching nearly to its shores.

The promontory still takes a rounding direction about E.N.E. 5 miles further, from whence the southern shore of the sound extends E. by S. $\frac{1}{2}$ S. 22 miles, to the West point of a *Peresonaia Creek*, the only opening in the shore from Point Macartney. The cove extends S.E. by S. about a league, forming a narrow isthmus, 2 miles across, from the head of Duncan Canal (p. 455), another striking instance of the extraordinary insular state of this region.

Point Gardner, as before mentioned, is the S.W. extreme of Admiralty Island, and forms the N.W. point of the entrance to Prince Frederick Sound. Off it, in a S.S.E. direction, lie some rocks and a small island, *Yasha*; the former at the distance of three-quarters of a mile, and the latter at that of 3 miles. The coast hence rounds irregularly to *Point Townsend*, a distance of 9 miles; off the projecting points are some rocks. Six and a half miles E.N.E. from this is *Point Nepean*, situated in lat. $57^{\circ} 10'$, long. $134^{\circ} 3'$. It is a high, steep, bluff, rocky point, and off it lies a ledge of rocks about half a mile. At 3 miles to the North of it on the eastern side is *Wooiwodski Harbour*. From this the coast takes a more northerly direction, or N.E. $\frac{1}{2}$ N. $10\frac{1}{2}$ miles, to Point Pybus; the coast between is much indented with small bays, and vast numbers of islets and rocks both above and beneath the water. It is in general but moderately elevated; and although it is composed of a rocky substance, produces a very fine forest, chiefly of pine. Northward of this is a large channel, called Stephens Passage. Prince Frederick Sound continues to the eastward and south-eastward.

Cape Fanshaw, which is the point of the mainland opposite, and forming

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the angle at which the two channels diverge, is low and projecting, but very conspicuous; in lat. $57^{\circ} 11'$, long. $133^{\circ} 25\frac{1}{2}'$. The branch is here 8 miles wide, and its northern shore takes a course E.S.E., 16 miles, to a low, narrow point of land $2\frac{1}{2}$ miles long, and half a mile broad, stretching to the South, called *Point Vandeput*. Here the breadth of the branch decreases to $3\frac{1}{2}$ miles in a South direction, to a steep bluff point; from this part the branch takes a more southerly course. South of Point Vandeput a shoal extends about a mile, and on its East side a small bay is formed, from whence the eastern shore trends S.E. by S. 7 miles to another point, off which a shoal extends about three-fourths of a mile. The shore here is a small extent of flat land, lying immediately before the lofty mountains, which rise abruptly to a great height immediately behind the border. A few miles to the South of this margin the mountains extended to the water-side, when a part of them presented an uncommonly awful appearance, rising with an inclination towards the water to a vast height, loaded with an immense quantity of ice and snow, and overhanging their base, which seemed insufficient to bear the ponderous fabric it sustained, and rendered the view of the passage beneath it horribly magnificent. (Vancouver, vol. iii. pp. 282-3.)

At a short distance to the South of this the head of the inlet appears closed by a beach extending all round the head of it. At high water this becomes a shallow bank, with an island on it, being the delta of the Stikine River. At high water it is covered, and by means of this channel, an inland navigation for canoes and boats is found from the southern extremity of Admiralty Inlet, in lat. $47^{\circ} 3'$, to the North extremity of Lynn Canal, in lat. $59^{\circ} 12'$, long. $135^{\circ} 37'$. The southern end of the shallow portion of Prince Frederick Sound enters the arm of the Duke of Clarence Strait between Point Blaquiére and Rothsay, described on page 454.*

STEPHENS PASSAGE, which is over 95 miles in length, opens into Prince Frederick Sound, between Point Pybus and Cape Fanshaw, which are 16 miles asunder; but it should be remembered that its north-western end is rocky, intricate, and very dangerous for shipping in the entrance into Lynn Canal, as hereafter shown.

N. by E. $6\frac{1}{2}$ miles from Cape Fanshaw is *Port Houghton*. The South point of the harbour is *Point Walpole*, near which are some islets and sunken rocks. Its North point is *Point Hobart*, N. by W. a league from the other, and from which extends a bank of sand, a little distance from the shore, but leaving a clear passage between it and the islets into the port. It extends E.S.E. 5 or 6 miles, and is bounded by lofty mountains, forming the shores of a snug harbour, with soundings of 10 to 6 fathoms a considerable distance from the

* Prince Frederick Sound was so named by Vancouver after the late Duke of York, on whose birthday his three years' survey of this desolate coast was here brought to a conclusion.

shore, sand and muddy bottom. From Point Hobart to *Point Windham* the bearing and distance are N.N.W. $\frac{1}{4}$ W. $12\frac{1}{2}$ miles. Opposite to Point Windham is *Point Hugh*, or Admiralty Island, and here perhaps it may be considered that Stephens Passage more properly begins.

Beyond Point Hugh is *Point Gambier*, bearing S.S.W. $\frac{1}{4}$ W. 5 miles from it; and this latter is N.E. $\frac{1}{4}$ N. 3 miles from Point Pybus, previously mentioned. Between the two former points is the entrance to *Seymour Canal*, which extends into the island, N.W. by N. 29 miles from Point Hugh to its head, in lat. $57^{\circ} 51'$. At its entrance it is from 2 to 3 miles wide, which gradually increases towards its head to 2 leagues. At its termination is a small brook of fresh water. The adjacent country is moderately high, and covered with timber of large growth, excepting towards Point Hugh, which is a lofty rocky promontory, from whence extends a ledge of rocks, on which the sea breaks with considerable force.

This point forms the South extreme of a long, narrow peninsula, dividing Seymour Canal from Stephens Passage. The S.W. coast of this passage, which is here about 5 miles in breadth, is nearly straight, compact, and free from rocks or other interruptions up to a high round island lying in the middle of the channel, in lat. $58^{\circ} 1'$, from which the western shore extends N. by W. 8 miles to *Point Arden*, where the branch divides into three arms, the principal one directed to the westward.

The eastern shore of the passage, up to this part, is composed of a compact range of stupendous mountains, chiefly barren, and covered with ice and snow, but affording some inlets. From Point Windham, on the South, to Point Astley, 13 miles to the North, the shores are very rocky. The latter is the South point of a deep bay, about 4 miles wide, named *Holkham Bay*. From *Point Coke*, its North point, in a direction S.W. $\frac{1}{4}$ S. $2\frac{1}{2}$ miles are two small rocky islets, nearly in the middle of the branch; and the eastern shore trends from it N.W. $\frac{1}{4}$ W. 9 or 10 miles to *Point Anmer*, the South point of Port Snettisham.

Port Snettisham first extends about a league from its entrance in a N.E. direction, where on each side the shores form an extensive cove, terminated by a sandy beach, with a fine stream of fresh water. On the N.W. side of the entrance (*Point Styleman*), which is in lat. $57^{\circ} 53'$, long. $133^{\circ} 49'$, is a small cove, on which there is also a run of water, with an islet lying before it. The shores are high and steep, and produce very few trees.

Taco, formerly an Hudson's Bay Company's establishment, formed in 1841, in Port Snettisham, is on a little harbour almost land-locked by mountains, being partially exposed only to the S.E. One of the hills, near the fort, terminates in the form of a canoe, which serves as a barometer. A shroud of fog indicates rain; but the clear vision of the canoe itself is a sign of fair weather.

Tako Arm.—Opposite to Point Arden, on the West shore, is the mouth

of the arm leading to the N.E. from Stephens Passage. Its West point of entrance is *Point Salisbury*, and it extends about N. by E. 13 miles, when the shores spread to East and West, and form a basin about a league broad and 2 leagues across, N.W. and S.E., with a small island lying nearly at its N.E. extremity. From the shores of this basin a compact body of ice extended some distance nearly all round at the time of Vancouver's visit; and the adjacent region is composed of a closely united continuation of the lofty range of frozen mountains, exhibiting as dreary and inhospitable an aspect as the imagination can possibly suggest. The rise and fall of tide here were very considerable, appearing to be upwards of 18 feet.

The River Taco or **Tako**, falling into the gulf to which it gives its name according to Mr. Douglas, who ascended it about 35 miles, pursues a serpentine course between stupendous mountains, which, with the exception of a few points of alluvial soil, rise abruptly from the water's edge. In spite of the rapidity of the current, the savages of the coast ascend it 100 miles in canoes. The tribes who live on the coast between this and Port Houghton are known as the Sundowns and Takos, and are treacherous and mostly hostile, numbering about 500.

From Point Arden the principal inlet takes a general course of W. $\frac{1}{4}$ N., and is about a league in width. About 5 leagues along the South shore is *Point Young*, forming the East point of a cove. Here the width of the arm is decreased to half a league, and the South shore stretches N.W. $\frac{1}{4}$ N. 7 miles to another cove with an islet lying near it. North from this cove $1\frac{1}{2}$ league distant, is the West point of *Douglas Island*, so named after the then Bishop of Salisbury, and forms the North side of this portion of the passage. It is about 20 miles long, and 6 broad in the middle, and separated from the continent by a narrow channel. To the N.W. of this part is a rocky and intricate portion of the passage, very dangerous for the navigation of shipping, so that the communication between it and the large channel to the North and West of it is impeded.

The channel beyond the N.W. point of Douglas Island is divided into two branches by a very narrow island about $4\frac{1}{2}$ miles long, and half a mile broad. The passage on its N.E. side may be considered as next to impassable for shipping, by the rocks and islets at the S.E. end of it. The other channel is equally unsafe and intricate, from the same cause.

Opposite the North end of the above island is *Point Retreat*, the northernmost point of Admiralty Island; it is in lat. $58^{\circ} 24'$, long. $134^{\circ} 59'$. About a league southward from Point Retreat, in the southern channel, is a deep cove, *Barlow Cove*, which, with the narrow island lying before it, forms a very snug harbour, of good access by the passage round to the North of Point Retreat, as the rocky part of the channel lies to the S.E. of it. To the West of Point Retreat and Admiralty Island is that extensive branch named by

Vancouver after the nobleman, Chatham Strait, to the South opening of which we will now return.

CHATHAM STRAIT.—Cape Decision, the S.E. point of entrance, has been before described. It was so named by Vancouver, from his having so far decided that the great openings stated to exist by De Fonte, De Fuca, and others, did not exist—a conclusion he was scarcely warranted in making, inasmuch as a more careful attention to their narratives show some truth, although much alloyed with the fabulous.

The other point of entrance is Cape Ommaney, the South extremity of the Sitka Archipelago; it was so named by Captain Colnett. Off it lies a rock called *Wooden Rock*, from one of Vancouver's men having been drowned here.

The opening between Capes Ommaney and Decision was named by Colnett Christian Sound, and off the opening is a group of small rocky islets, a league in extent, called the *Hazy Islands*. They lie S. $\frac{3}{4}$ E. 16 leagues from Cape Ommaney, S.W. by W. $\frac{1}{4}$ W. from Cape Decision, and 3 leagues West from Coronation Island, which is the nearest land to them.

The eastern shore of the strait, from its southern point to the entrance of Prince Frederick Sound, has been before described (p. 459). *Point Gardner*, the North point of its entrance, is also the southern extremity of Admiralty Island.

Hood Bay.—From Gardner Point the eastern shore of the strait runs about N. $\frac{3}{4}$ W. 22 miles to Hood Bay, which is about $1\frac{1}{2}$ league across to *Point Samuel*, and has some islands nearly in its centre. At $2\frac{1}{2}$ miles eastward of Point Samuel, on the North shore of Hood Bay, is the entrance to an extensive inlet, which runs in a N.E. direction for 20 miles, nearly to the head of Seymour Channel, and thus separating Admiralty Island into two peninsulas.

KOUTZNOU or Kushnou, an Indian settlement on the South point of the entrance to this strait, is in about lat. $57^{\circ} 30' N.$, long. $134^{\circ} 32' W.$ It is one of the *military posts* established by the United States. The tribe of Indians which give it the name are (or were) about 800 in number, and had a bad reputation.

Point Parker is 9 miles N. $\frac{3}{4}$ W. from Point Samuel. The coast is indented into several small bays; the shores are low, and much divided by water. Beyond this, still following the same direction for 30 miles, is *Point Marsden*. The land is very moderately elevated, covered with fine timber, chiefly pine, and terminating at the water-side with alternate steep rocky cliffs and small sandy bays. Hence to Point Retreat, which is the North extremity of Admiralty Island before mentioned, the distance is about 16 miles, the coast being nearly in the same direction and of the same character as that more to the South.

ADMIRALTY ISLAND.—The shores of Admiralty Island, which have

thus been described, are about 60 leagues in circuit. With the exception of its N.W. and S.E. parts, they are very bold, affording many convenient bays likely to admit of safe anchorage, with fine streams of fresh water flowing into them, and presenting an aspect very different from that of the adjacent continent, as the island in general is moderately elevated, and produces an uninterrupted forest of very fine timber trees, chiefly of the pine tribe; whilst the shores of the continent, bounded by a continuation of those lofty frozen mountains which extend south-eastward from Mount Fairweather, rise abruptly from the water-side, covered with perpetual snow, whilst their sides are broken into deep ravines or valleys, filled with immense mountains of ice; notwithstanding that the island seems to be composed of a rocky substance covered with little soil, and that chiefly consisting of vegetables in an imperfect state of decay, yet it produces timber which was considered by Mr. Whidbey to be superior to any he had before noticed on this side of America. The ocean hereabouts, too, encroaches most rapidly on the low land. The stumps of trees, in various stages of decay, still standing erect, are to be found below high-water mark, and many of the low shores, now covered with the sea, produced, at no very distant period, tall and stately timber.

LYNN CANAL.—In lat. $58^{\circ} 35'$ a point projects from the West shore of Lynn Canal, which bears N.N.W. from Point Retreat and N. by W. from Point Couverden, the extremity of a peninsula separating the canal from Chatham Strait. Both sides of the arm are bounded by lofty, stupendous mountains, covered with perpetual ice and snow, whilst the shores in the neighbourhood appear to be composed of cliffs of very fine slate, interspersed with beaches of paving-stone. The channel continues to be about 5 miles wide, and the western shore straight and compact. In lat. $58^{\circ} 54'$ is a small islet about 2 miles from the West shore. Another islet lies to the North, between it and the South point of an island 5 miles long and 1 broad, lying along the western shore, and forming a channel about a mile wide, having at its southern entrance shoals that extend nearly from side to side. Beyond this the arm diverges into two branches, the West one terminating in its navigable part in lat. $59^{\circ} 12'$. At its head, according to Lisiansky's chart, is the native village of *Chilhat*. There are some islets and rocks in mid-channel, and above these the water is perfectly fresh. Above the shoal limiting the navigation the arm extends half a league, and through a small opening a rapid stream of fresh water rushes over the shoal. The eastern side of this portion of the arm is low and indented into small bays and coves, extending S.E. $\frac{1}{2}$ S. $4\frac{1}{2}$ leagues to *Seduction Point*. This peninsula is a narrow strip of low land 1 or 2 miles across, separating the western from the eastern arm, which extends N. by W. $\frac{3}{4}$ W. about 11 miles, and thence winds in a westerly direction about 3 miles further, where it terminates in low land, formed immediately at the foot of high stupendous mountains, broken

North Pacific.

into deep gulleys, and loaded with perpetual ice and snow. The eastern shore of the inlet trends in a compact manner to Point St. Mary, in lat. $58^{\circ} 43\frac{1}{2}'$, forming the North point of a bay called *Berner Bay*, about 4 miles across in a S.S.E. direction, and about 5 miles deep to the N.N.E. From its South part, *Point Bridget*, the continental shore takes a direction S.S.E. $\frac{1}{2}$ E., and at 18 miles lies a small island, with some rocks and islets about it. Beyond this navigation is difficult, even for boats, being incommoded with numberless islets and rocks.

Lynn Canal was first made known and surveyed by Vancouver's party, under Mr. Whidbey, in July, 1794, and was named by the commander after his native town in Norfolk.

It receives a river, which the Indians ascend about 50 miles to a valley running towards Mount Fairweather, and containing a large lake, which pours its waters into the open ocean at Admiralty Bay. The natives of this valley are called the Copper Indians, from the abundance of virgin copper in the neighbourhood.

THE SITKA ARCHIPELAGO.

The land forming this collection of islands, named by Vancouver King George III. Archipelago, was first discovered by Alexoi Tschirikow, the second in command of the expedition under the unfortunate Behring, in 1741. This was their third voyage, and they were separated by a storm soon after they had set out on their voyage. Tschirikow directed his course to the East, from the parallel of 48° , and, towards the middle of July, to the land of America, between the fifty-fifth and fifty-sixth parallels; others place his landfall in 58° . The coast which he found was steep, barren, guarded by rocks, and without a single island that could afford shelter. He anchored off the coast, and detached his long-boat, with orders to put on shore wherever she could land. Several days elapsed without her reappearing; he despatched his other boat to gain tidings of her, but the latter no doubt experienced the same fate as the former, and it is unknown what became of either. Some canoes, manned by native Americans, presented themselves a few days after, to reconnoitre the ship; but they durst not approach her, and there remained on board no boat of any sort that could be detached to join or pursue them, and prevail on them to come to the ship, where they would have been detained for hostages. Tschirikow, despairing to see again the men whom he had sent on shore, resolved to quit the coast, and accordingly returned to Kamtschatka. These discoveries became known to France and Europe from the fact of Delisle de la Croyère, one of the brothers of the French savans, and Dr. Steller, the naturalist, having accompanied Tschirikow. Such was the first authentic discovery of North-West America, which arose out of the original plans projected by

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Peter the Great, and subsequently carried into effect by the Empress Catharine. It has since been called the Sitka Archipelago, from the tribe of Indians who inhabit it.

The land in question, like Vancouver Island and others to the southward, was then supposed to form part of the American continent; and it was not until Vancouver's expedition that Chatham Strait was discovered, and thus showed the real nature of the land on the Pacific. Vancouver, too, as will be seen from the preceding remarks, did not very minutely examine the western shore of the strait to which he gave the name of his vessel, but just inferred that it was penetrated by one or more channels leading to the open ocean, from the fact of some of the natives being found in the strait who belonged to the other side of the islands.

Capt. Urey Lisiansky, of the Russian navy, examined the group in 1805, and, by his survey, it appears that it consists of four principal islands, viz., Jacobi, Kruzoff or Crooze, Baranoff, and Chichagoff.

Although Vancouver examined the channels to the eastward of it, and the Russians have surveyed, partially, the western coast of the chief island, yet our acquaintance with its physical characteristics is still very limited.

BARANOFF ISLAND is the southernmost, and is about 85 miles in length, by about 20 miles on its maximum breadth. On its West side is Sitka or Norfolk Sound, the principal place of resort in these seas, and the situation of the head-quarters of the Imperial Russian Company.

KRUZOFF or Crooze Island, the South extremity of which is formed by Cape and Mount Edgecumbe, lies before Sitka Sound. It was named so by Captain Lisiansky, after the Russian Admiral. It is separated from Baranoff Island by Neva Channel. It is 18½ miles in length. At its North extreme is the Klokacheva Sound, or the Bay of Islands, but which leads to the strait, separating the two principal islands of the group, called by Lisiansky *Pagoobnoy* or *Pernicious Strait*. It joins Chatham Sound, is deep, and derives its name from a party of Aleutians having been poisoned there some years previously by eating mussels. Crooze Island is called Pitt Island in La Pérouse's and some other early charts.

CHICHAGOFF ISLAND is the next and northernmost large island. It is divided from Baranoff Island by the strait previously mentioned, and extends from it to Cross Sound, which separates it from the continent to the northward.

Jacobi Island, the fourth of those described by Lisiansky, lies at the N.W. extremity of Chichagoff Island. The passage separating them was not explored by Lisiansky.

CAPE OMMANEY, in lat. 56° 9', long. 134° 34', is the South extreme of the archipelago; off it lies *Wooden Rock*. They have been alluded to before on page 464, as forming the S.W. entrance point of Chatham Strait.

Port Conclusion.—Two leagues N. by E. ½ E. from Cape Ommaney, on

the eastern coast of Baranoff Island, is the southern point of the entrance to Port Conclusion, so called because it was here that Vancouver's vessels awaited the conclusion of the survey of this coast in August, 1794, having left England on the 1st of April, 1791, for that service. The North point of Port Conclusion bears from the southern N. $\frac{1}{2}$ W. 2 miles distant. The depth of water in mid-channel, between these points, is 75 fathoms, but decreases to 8 or 10 close to the shores, without rocks or sands. S.S.W. about half a mile from the North point of entrance is a most excellent and snug basin, *Port Armstrong*, about a mile long, and a third of a mile wide; but its entrance is by a very narrow channel, half a mile in length, in a W.S.W. direction.

The western shore of Chatham Strait was not minutely surveyed by Vancouver's party. It follows a nearly straight direction from Port Conclusion, about N. by W. for 105 miles to *Point Augusta*, in lat. $58^{\circ} 34'$, long. 135° , preserving a nearly parallel direction to the opposite side, which varies from 5 to 9 miles distant.

This extensive arm, as far as was ascertained, is without danger, and probably affords many places of refuge. The flood tide, although of short duration, not running more than two hours, was regularly observed to come from the South.* To the northward of Point Augusta the western shore diverges more to the westward, while the eastern side beyond Port Marsden still preserves the same direction. Into the opening thus formed a peninsula of the mainland projects to the southward, thus dividing it into two channels, the principal being to the N.W., while that which continues on in a North or West course is called *Lynn Canal*.

Point Couverden, the South extremity of the above peninsula, is in lat. $58^{\circ} 12'$, long. $135^{\circ} 4'$. It was so named after the seat of Vancouver's ancestors in Holland. The continental shore in this neighbourhood constitutes a narrow border of low land, well wooded with stately trees, chiefly of the pine tribe, behind which extends a continuation of the lofty snowy mountains. About 2 miles North of Point Couverden is one small island and three rocky islets, one of which lies nearly in mid-channel. Beyond this the western shore of the arm is firm and compact, indented with a few coves, and some islets and rocks lying near it. The eastern shore, described on page 465, presents a broken appearance.

From Point Couverden the continental shore takes a somewhat irregular

* Mr. Whidbey considered that Chatham Strait was likely to be one of the most profitable places for procuring the skins of the sea-otter on the whole coast, not only from the abundance observed in the possession of the natives, but from the immense numbers of these animals seen about the shores in all directions. Here the sea-otters were in such plenty that it was easily in the power of the natives to procure as many as they chose to be at the trouble of taking. They were also of extremely fine quality.—(Vancouver, vol. iii. p. 264.)

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direction, N.W. $\frac{1}{2}$ W. 7 leagues, to a part of which lies a low and nearly round island, about 2 leagues in circuit. About a league to the eastward of it lie some islets. To the North and West of this the shores of the continent form two large open bays, terminated by compact, solid mountains of ice or glaciers, rising perpendicularly from the water's edge, and bounded to the North by a continuation of the united lofty frozen mountains that extend eastward from Mount Fairweather. An island lies W. $\frac{1}{2}$ S. from the low round island above mentioned, distant from it 3 leagues. This island is about 7 miles long, N.E. and S.W., and 3 miles broad. On its North side is a channel 2 to 3 miles wide, between it and the continental shore. The N.W. point of this channel is *Point Dundas*, in lat. $58^{\circ} 21'$, long. $135^{\circ} 55'$.

To the westward of this point is a branch extending to the North and N.W. At about 2 leagues up it the channel is nearly stopped by shoals, rocky islets, and rocks, 4 miles beyond which it is finally closed, being in most places greatly encumbered with ice. The entrance, which is about 2 miles wide between Points Dundas and Wimbledon, has, in mid-channel, only 18 fathoms water. About the entrance the soundings are regular, of a moderate depth, and afford good and secure anchorage; but in the summer season (or in July) vessels would be much inconvenienced by the immense quantities of floating ice.

CAPE SPENCER, the North point of the entrance of Cross Sound, on the Pacific Ocean, is a very conspicuous, high, bluff promontory. Off it extend some rocks for about half a league. It is in lat. $58^{\circ} 14'$, long. $136^{\circ} 35'$, and bears from Point Wimbledon S.W. $\frac{3}{4}$ W., distant 11 miles.

The southern shore of this portion of the strait is of a more broken character than the northern. We have described it as far as Point Augusta, lying opposite to Points Marsden and Couverden. From this to *Point Sophia* is N. by W. $\frac{1}{2}$ W. 17 miles; the coast composed chiefly of rocky cliffs, with islets and detached rocks lying at some distance from the shore. The latter point is at the N.E. of the entrance of *Port Frederiek*, the entrance of which is about a league wide, East and West, winding to the southward, and apparently much divided by water. From the West side of this sound the shore takes a more northerly direction, with some islets near it, to a point which is the North extreme of King George Archipelago, in lat. $58^{\circ} 18'$. Hence the coast takes an irregular course, W. by S. $17\frac{1}{2}$ miles, to *Point Lavinia*, containing many open bays. On the opposite shore of the sound is *Point Wimbledon*, just mentioned, bearing N. by W. 6 miles from it. Between these points is a group of one low and two high rocky islands, with some rocks and islets about them.

Port Althorp is to the westward of Point Lavinia, which extends 11 miles to the southward of it. Its South point of entrance is *Point Lucan*. From Point Lucan, in a direction about N.W., lies a narrow, high island, about

2½ miles in length; and between its S.E. point and Point Lucan there are two small islets, which render that passage not so commodious for sailing in and out of the port as that to the North of the island, between it and the western part of a cluster of three small islands, which extend about 2 miles from the eastern side of the port. This channel is clear, free from danger, and is about 1½ mile in width, with a tolerably snug cove, in which Vancouver anchored, just within its N.W. point of entrance. The high narrow island affords great protection to the northern part of this port, which, opposite to that island, is about 2½ miles wide; but nearly in the middle of the harbour, and opposite the South point of the island, are some detached rocks; and at Point Lucan, which is situated from Vancouver's ships' cove, S.S.E. 4½ miles distant, the width of the harbour is 2 miles, from whence it extends S.E. ¾ S. about 2 leagues, and terminates in a basin that affords good and secure anchorage, the best passage into which is on the eastern shore.

CROSS SOUND was discovered by Captain Cook, in his last voyage, on Sunday, May 3rd, 1778, and was named by him from the day marked in the calendar. Its existence was denied by some after its original discovery, but the survey of it proves that Cook's description is much more accurate than from the transitory, distant view he had of it might have been reasonably expected. Its eastern limits may be placed at Points Lavina and Wimbledon, which have been previously described. From seaward it appears to branch into many openings. Its southern shore, from Point Lucan to Point Bingham, which is opposite to Cape Spencer, trends S.W. by W. ¼ W. 10 miles. Between these points an opening takes a S.E. by S. direction for some distance. *Point Bingham*, which lies S. by E. ¼ E. 10 miles from Cape Spencer, affords a bold entrance into the sound, without rock, shoal, or any permanent obstacle. The group of rocky islands noticed as existing to the South of Pt. Wimbledon, form a kind of termination to Cross Sound, and almost separate the ocean from Chatham Strait, to the eastward of it; but on either side of these islands there are two narrow channels, both of which are free from rocks, shoals, or any other impediment, excepting the large masses of floating ice, which render them very dangerous in the summer season, and in the winter they are most probably entirely closed or impassable.

The unfortunate *La Pérouse* touched on this part of the coast, previous to his departure for the West, in 1786. He makes the following remarks upon it:—

At Cross Sound the high mountains covered with snow terminate, the peaks of which are 8,000 or 9,000 ft. high. The country bordering on the sea, S.E. of Cross Sound, although elevated 5,000 or 6,000 feet, is covered with trees to the summit, and the chain of primitive mountains seems to penetrate further into the continent. *Mount Crillon*, almost as elevated as Mount

Fairweather, is to the North of Cross Sound, in the same way that Mount Fairweather is to the North of the Baie des Français; they will serve to point out the ports they are near to. The one may be readily mistaken for the other, in coming from the South, if the latitude should not be correct within 15'. Otherwise, from all points, Mount Fairweather appears accompanied by two mountains, less elevated; and Mount Crillon, more isolated, has its peak inclined towards the South.

CAPE CROSS, which was considered by Cook as forming the S.E. point of entrance to the sound, is not precisely so, but lies about 7 miles South of Point Bingham, which forms the true S.E. point. The interior part is a low rocky land, free from any danger.

From Cape Cross the coast takes a direction of S. 31° E., about 7 leagues, to another promontory, to which Vancouver gave the name of *Cape Edward*, and off which lies a cluster of small islets and rocks. The coast between these capes is much broken, and has several openings in it that appear likely to afford shelter. That which appeared to Vancouver to be the easiest of access lies about 2 leagues to the northward of Cape Edward, and as it is in lat. 57° 44', he was led to conclude that this opening was Portlock Harbour.

Portlock Harbour.—About 2 miles from the shore to the N.W. of it, we had 20 and 25 fathoms water, muddy bottom, and just within the entrance were some high barren rocks. On getting into the entrance of the passage, which is about a mile across, we deepened the water to 30 fathoms, sandy bottom, the barren rocks just mentioned (and Hogan Island) forming the South side; the northern side is Hill Island, low land. About half a mile within the barren rocks we had 30 fathoms over a rocky bottom, which depth and bottom we carried at least a mile further, steering N.E. by E., which is nearly the course into the harbour. Presently afterwards we shoaled the water to 10 fathoms, being then in the narrowest part of the channel, having to the North some bold rocks, and to the South a bluff point of land; to the East of which, a small distance from shore, are some rocks which just show themselves above water. Immediately on passing these rocks we deepened the water very quickly to 30 and 40 fathoms, and a most spacious and excellent harbour opened itself to our view, bending to the N.W. and S.E., and running deep into the northward, with a number of small islands scattered about. We ran up towards the N.W. part of the harbour, and after passing a small island near the North shore covered with trees, we anchored in 31 fathoms, mud, entirely land-locked; the rocks lying in the inner part of the passage, just shut in with the small island already mentioned, and bearing South 3 or 4 miles distant.—*Portlock*, p. 257-8.

Goulding Harbour is a branch of Portlock Harbour, extending from its N.W. part. It runs in a zig-zag direction, between North and N.E., about 5 miles to the head of it from the island on the entrance, with trees scattered about in various parts.

From Cape Edward the coast takes a direction about S. 30° E. to a very conspicuous opening, named by Capt. Cook the *Bay of Islands*. He rightly considered that it was the entrance to a channel which separated the land, on which Mount Edgecumbe is situated, from the adjacent shores. It is also the entrance to the channel separating the two principal islands of the Sitka Archipelago. The names given by Cook and others are now forgotten, and the Russian charts of 1848 and 1853 give Russian names to all the points. We are unable to give any directions for them; the charts must supply all information for the present.

CAPE EDGECUMBE, the S.W. point of Kruzoff Island, the Cabo del Eñgano of the Spanish charts of Maurelle, is low land, covered with trees, which projects considerably into the sea, lat. 57° 2', long. 135° 46'.

Mount Edgecumbe, which stands on the South end of the island, inland of the cape of the same name, is the Mount San Jacinto of the Spanish charts. It was estimated by Lisiansky, who ascended it, to be about 8,000 feet in height; on the last Russian chart it is said to be only 2,800 feet, a remarkable difference. The side toward the sea is steep, and was covered with snow (in July, 1805); that towards the bay (to the southward) is smooth, and of gradual ascent, and overgrown with woods to within 1½ mile of the top. This upper space exhibits a few patches of verdure, but is in general covered with stones of different colours. On the summit is a basin, or crater, about 2 miles in circumference, and 40 fathoms deep, the surface covered with snow.

SITKA SOUND.—The name is that of the natives, who call themselves Sitka-hans. It is probably the same as that called by the Spaniards, *Bay de Guadalupe*. It is also called *Tchinkitanay Bay* by Marchand and other authors. The name of *Norfolk Sound* was applied to it by Dixon, whose industry first made known its real character; he anchored, probably, in the first cove round Cape Edgecumbe, and did not penetrate to the eastward, to where the present Russian establishment is. The charts and descriptions of this period are so imperfect that they would probably rather tend to mislead than instruct.

A bold, enterprising man, of the name of Baranoff, long superintended the company's establishment. Although the conquest of the Sitkans (Sitka-hans), a branch of the Kaloschians or Kalushes, was not easily achieved, he finally accomplished it. A warlike, courageous, and cruel race, provided with fire-arms by the ships of the North American United States in exchange for otter-skins, they maintained an obstinate struggle against the invaders. But Baranoff at length obtained a decisive superiority over them. He built some dwelling-houses, made an intrenchment, and having, in his own opinion, appeased the Kalushes by profuse presents, confided the new conquest to a small number of Russians and Aleutians. For a short time matters went on prosperously, when suddenly the garrison left by Baranoff, believing itself

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in perfect safety, was attacked by great numbers of Kalushes, who entered the intrenchments without opposition, and murdered all they met with there with circumstances of atrocious cruelty. A few Aleutians only escaped to Kodiack, where they brought the news of the destruction of Sitka. This took place in 1804, at the period that Admiral Krusenstern made his voyage round the world, and his second ship, the *Neva*, was bound for the colony. Baranoff took advantage of this, and with three armed vessels he accompanied the *Neva* to Sitka. The Kalushes retired at his approach to their fortifications, and attempted to maintain a siege, but the guns from the ships soon caused a speedy surrender. They were allowed to retire unmolested, but they stole away secretly on a dark night, after murdering all of their party who might have been an encumbrance to them. Baranoff thus became nominally possessed of the island, but in reality of a hill forming a natural fortification, and formerly inhabited by a Kalush chief called Katelan.

Sitka Sound is 12 miles wide at the entrance between Cape Edgecumbe and Sitka Point to the N.W., and the N.W. point of *Biorka Island* (the *Point Wodehouse* of Vancouver) to the S.E. This last is the outermost of a labyrinth of islands which extends many miles to the S.E. It is about 2 miles in diameter, and appears to have a clear channel three-quarters of a mile wide to the East of it, but at more than half a mile S.S.E. of its South extreme, or one-third of a mile from *Neprop*, an islet off it is the *Vasileva Rock*, dangerous. A still more important danger, which will require all caution in entering the sound and making for the settlement, is a *sunken rock*, with only 10 feet at low water, lying 2 miles S.W. by W. ½ W. *mag.* from the N.W. point of Biorka. There are several other detached breakers and shoals shown on the chart higher up the island, which cannot well be described verbally. At 12 miles north-eastward from the line of the opening of the sound is the Russian establishment of Sitka or *Novo Arkhangel*, on a promontory, within a range of scattered islets and rocks, which should not be attempted by a stranger without a pilot.

SITKA or New Archangel, the Russian establishment, stands on the N.W. point of a bay on the eastern side of the sound. The arsenal is in lat. 57° 2' 45", long. 135° 17' 10" W.

The harbour and approaches to Sitka have been surveyed, as before stated, by the Russians, and the plan by Captain Yassilieff, 1850, will be the best guide for entering the port.

The establishment, as may be supposed, is in a state of transition, since its change of masters. Of its future it would be hard to predict, but there can be no doubt but that, under the vigorous rule of the new government, many of its capabilities will be developed. But as the trade in furs is under restriction, and the climate forbids the hope of much agriculture being

successful, the chief objects of colonization are shut out from general enterprise.

In one respect its fortunes are already changed. Under the Russians it was a remote and isolated place; now it has a regular steam communication with San Francisco, distant about 1,500 miles.

Mr. Frederick Whympere visited it in 1865, and his interesting volume, chapter vii, will give a good account of its condition at that time. The following is taken from an article in the *Mercantile Marine Magazine*, 1869, which gives a description of the place as it is under the new regime.

The harbour of Sitka is a very picturesque one, with plenty of water for the largest ships to pass in and out, but a dangerous one, owing to the large number of little islets and rocks, between which pass narrow channels, any of them with sufficient water to float a ship, but hardly sea-room enough to be safe; however, the old Russian pilot seems to have no difficulty in getting through them when required. The entrance to the harbour is superb. Mount Edgumbe towers up some 8,000 feet above the level of the sea; its immense crater, filled with snow, marks the north-western boundary of the harbour, and can be seen at a great distance. Baranoff Island is made up of mountains piled on mountains, looking as if pushed up out of the sea by some grand convulsion of nature at no very distant day, as evidenced by their peaked summits and jagged outlines.

The town of Sitka, formerly New Archangel, is situated on a point of land jutting out into the bay, from the base of the mountains, probably containing about 1,000 acres, and from the character of the soil appears to have been made by the washings of the ocean. On the point is a large lake of fresh water, in front of which, along the edge of the bay, are about 150 log houses, scattered about promiscuously. There is but one street, and that extends through the whole length of the town, and is continued for about a mile to Indian River, a little mountain stream emptying into the bay at this point. This is the only road on the island; beyond this, and in fact, on all sides of the island, for some distance before you reach its termination, the thicket is impenetrable. This little river furnishes splendid water, cold as ice, and seems to get its supply from the melting snows on the summit of the mountains. To this little river the road leads, and was made by the Russians for the purpose of getting water, as the lake water is hardly fit to drink. There is not a well or cistern on the island, a large proportion of the water used being carried in small casks slung on a pole, on the shoulders of two men or women.

The governor's house is built on a rock, and overlooks the town and bay, is a very large structure, and heretofore furnished not only a residence for the governor, but for many of the officers of the company. There are large rooms on the second floor, readily converted into one immense room, the partitions being moveable, for entertainments, which were given by the

governor very often, he being allowed a fund for this purpose by the Company. The house is surrounded by a wide platform, the side towards the bay being protected by a redoubt and stockade, in which cannon were mounted, as well as on the platform. The garrison flagstaff is on this platform. The house is approached by three flights of steps; on the first platform is a covered way to the entrance of the house; on the next, a sentry-box, and on the next, on one side the guard-house and on the other a service magazine; and at the foot of the steps the barracks for the soldiers. All approaches to it were well guarded. On the other three sides are the Company's warehouses, still occupied in part by them, forming a hollow square, with a battery of some twelve or fourteen guns bearing on the Indian village, and one of the approaches to the town.

There is a dock here, which is in a dilapidated condition, and cannot be used for ships to lay alongside of until it is extended. The Russians had an old hulk anchored in front of it and a staging built, but this was destroyed by the furious gale we had here shortly after our arrival.

The Company's office was on the left of the entrance to the governor's house. This is now occupied; the upper part of it for officers' quarters, and the lower rooms for the head-quarters and collector's office. Opposite the entrance to the greenhouse is a ship-yard, and further on, on the edge of the bay, is a large storehouse, now occupied by the quartermaster. The stockade, separating the Indian village from the town, runs in a north-easterly direction, and is about 1 mile in length, terminating at the lake.

The Greco-Russian church has rather an imposing cathedral here, which is a great relief to the appearance of the town. It has a dome and steeple, with a chime of bells, stands nearly in the centre of the town, fronting the main street, in fact is in its centre, the street fronting on each side. It is built in the form of a cross, and although it has a rather rough exterior is very gorgeous inside, decorated with the paraphernalia appertaining to the church service, which is very imposing and magnificent. The church property here consists of the bishop's house, widows' home, cathedral, and chapel. The Indian village fronts the bay, and contains about one hundred large huts, built of hewn logs, and very substantial—built for defence as well as to live in. There are from eight to twelve hundred warriors, with their squaws, children, and dogs. Up to the time of our arrival they were not permitted to come into the town, except as they were wanted by the Russians to work. A few passes were given to the more distinguished chiefs; but since the stars and stripes have floated from the flagstaff, Mr. and Mrs. Indian have been permitted to pay us their respects any time between reveillé and retreat; but after that, if caught in town, are locked up in the cells until morning, and possibly, for example sake, for two or three days.

Biorka Island, or Point Wodehouse, as previously mentioned, is the S.W.

point of Sitka Sound. An extensive group of islets and rocks extend S.S.E. from it for 3 or 4 miles from the shore, which, from that point, with little variation, takes a course of S. 36° E. This part of the coast is much broken into small openings, with islets and detached rocks lying off it.

We can offer no account of it. At 20 miles from Biorka Island the Russian charts show an extensive inlet, trending to the N.E., named Whale Bay. It is the *Port Banks*, of Capt. Dixon, is in lat. 56° 35', and the following are Dixon's remarks on it:—"The prospect at Port Banks, though rather confined, yet has something more pleasing and romantic than any we had seen on the coast. The land to the northward and southward rises sufficiently to an elevation to convey every idea of winter; and though its sides are perpetually covered with snow, yet the numerous pines, which ever and anon pop out their lusty heads, divest it of that dreary and horrific cast with the barren mountains to the N.W. of Cook River (Inlet). To the eastward the land is considerably lower, and the pines appear to grow in the most regular and exact order; these, together with the brushwood and shrubs on the surrounding beaches, form a most beautiful contrast to the higher land, and render the appearance of the whole truly pleasing and delightful."

Cape Ommaney, the southern extremity of the Sitka Archipelago, lies 45 miles from Point Wodehouse, and has been previously described, p. 464.

Thus the entire circuit of this archipelago has been imperfectly noticed.

We now return to the northward, taking up the description at the point where Cross Sound terminates.

Cape Spencer, the point above named, has been noticed on p. 469.

From Cape Spencer the coast takes a direction of N.W. It is steep and entire, well wooded, and, with the exception of one opening, *Altona Gulf*, between it and Cape Fairweather, appears not likely to afford shelter for shipping. The coast is completely bounded at a little distance by steep, compact mountains, which are a continuation of the same undivided range stretching from the eastward.

CAPE FAIRWEATHER is placed by Vancouver in lat. 58° 50½', long. 137° 50'. This cape cannot be considered as a very conspicuous promontory; it is most distinguished when seen from the southward, as the land to the West of it retires a few miles back to the North, and there forms a bend in the coast, and is the most conspicuous point eastward of Cape Phipps, at Behring Bay, to the northward.

MOUNT FAIRWEATHER is one of the most remarkable mountains on the N.W. coast of America; it is 14,708 feet high; in lat. 58° 54', long. 137° 38', and 9 miles from the nearest shore. Captain Cook says: "This moun-

tain is the highest of a chain, or rather ridge of mountains, that rise at the N.W. entrance of Cross Sound, and extend in a N.W. direction, parallel with the coast. These mountains were wholly covered with snow (in May, 1788), from the highest summit down to the sea-coast (which was 12 leagues distant), some few places excepted, when we could perceive trees rising, as it were, out of the sea; and which, therefore, we supposed grew on low land, or on islands bordering on the shore of the continent.

From Cape Fairweather to *Cape Phipps*, at the entrance of Behring Bay, the distance is 73 miles; the intermediate coast is a low border extending from the base of the mountains, well wooded, and in some parts appears to be much inundated, the waters finding their way to the sea in shallow rivulets, through two or three breaks in the beach.

BEHRING BAY, the true situation and character of which was first elicited by Vancouver, runs inland, to the N.E., between Cape Phipps and Point Manby. Captain Cook, supposing that a bay existed to the S.E., conceived it to be the bay that Chetrow, the master of Behring's fleet, reconnoitred. This mistake was also followed by Capt. Dixon, who gave the name of Admiralty Bay to that in question; but as Behring certainly was the discoverer of a bay in this locality, and there being but one, the name of that navigator has supplanted that applied by Dixon.

Cape Phipps, the south-easternmost point of Behring Bay, is in lat. $59^{\circ} 33'$, long. $139^{\circ} 47'$. About 2 miles within it, the coast taking a S.E. direction, there is a small opening in the low land, accessible only for boats, near which was found an Indian village. Captain Sir Edward Belcher states that he was driven much to the *westward* by the current near Cape Phipps (vol. i. p. 82.)

Point Turner, which is a low narrow strip of land, forming the S.E. point of the island that protects Port Mulgrave from the ocean, is E. $\frac{1}{4}$ S. $2\frac{1}{2}$ miles from the inner or North point of Cape Phipps. About a league E $\frac{1}{4}$ N. from Point Turner is a point on the main land, which is the East end of a rounding bay, about 4 miles across to Cape Phipps. It is necessary to give a good berth to Cape Phipps, in order to avoid a small reef that stretches from it into the sea. Cape Turner, on the contrary, is bold, and must be kept close on board, for the purpose of avoiding the shoals that lie a little distance to the eastward of it; between these shoals and the point good anchorage is found, in 8 to 14 fathoms, clear good holding ground.

The rise and fall of the tide here are about 9 feet; and it is high water about 30' after the moon passes the meridian.

PORT MULGRAVE lies to the N.E. of Point Turner, and is protected from the ocean, as before stated, by an island lying in a N.E. and S.W. direction.

It was possibly first discovered by Capt. Dixon, June, 1787, who named it after that nobleman. It contains a number of small low islands, which, in

common with the rest of the coast, are entirely covered with pines, intermixed with brushwood. To the North and West are high mountains covered with snow, 10 leagues distant.

It was visited by Sir Edward Belcher, in *H.M.S. Sulphur*, who stayed a short time here. Fish, halibut, and salmon of two kinds, were abundant and moderate, of which the crews purchased and cured great quantities. Game very scarce. The remains of the Russian establishments were observed; a blockhouse pitched on a cliff, on the East side; and on the low point, where the astronomical observations were taken, the remains of another; also a staff, with a vane and cross, over a grave. Sir Edward Belcher says that a good leading mark for the entrance to the harbour is with Mount Fairweather over Cape Turner (or N. 88° E.)

An off-shore shoal, 7 fathoms, sand, was probably crossed by the *Sulphur* in coming out of Port Mulgrave, when no land could be seen within 3 miles. —(Belcher, vol. i, p. 89.)

The island or islands before alluded to, which form the outer face of Port Mulgrave, and of which Point Turner is the S.W. extremity, extend for 8 miles in length. They are almost joined to the continental shore by a spit incommoded with many rocks and huge stones, but leaving a very narrow channel, by which Vancouver's vessel, the *Chatham*, passed from one part of the inlet to the other, from the northward.

Knight Island is 5 miles N.N.E. of the northern entrance to the channel just described. It admits of a navigable passage all round it, but there are some rocks that lie about half a mile from its West point; and there is an islet situated between it and the main land, on its N.E. side.

Eleanor Cove.—From the North entrance to Port Mulgrave the continental coast takes a N. 30° E. direction, 6 miles, to this cove, which is the eastern extremity of Behring Bay. It is protected from the westward by Knight Island, which is about 2 miles long in a N.E. and S.W. direction, and about a mile broad, lying at the distance of a mile from the main land.

The shore here is low, and trends about N. 14° W. 6 miles to *Point Latouche*, the S.E. limit of *Digges Sound* or *Bay*. The two points forming the entrance to Digges Sound, thus named by Vancouver, are bluff, lying nearly East and West of each other, half a league asunder, the easternmost of them being Point Latouche, as above mentioned. The shores are composed of a continuation of the low border, extending from the foot of the mountain to the sea-side, and are bounded by frozen ice or snow, especially in the sound.

The continental coast, forming the North side of Behring Bay, runs to the southward of West, and is nearly straight and compact. At 8 miles from the opening the land falls back, forming a small bay, with a

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Point Manby forms the N.W. point of Behring Bay. It is in lat 59° 42', long. 140° 13'. To the eastward of it the country is well wooded, and proceeding northward it loses its verdant and more fertile appearance; the coast still continues to be a low compact border of plain land.

Point Riou, though no longer existing, was a tolerably well-marked promontory at the period of Vancouver's survey, and to whom it owes its name. He describes it as being low, well wooded, with a small islet detached at a little to the westward of it. The coast is still composed of a spacious margin of low land, rising, with a gradual and uniform ascent, to the foot of the still connected chain of lofty mountains, whose summits are but the base from whence Mount St. Elias towers majestically conspicuous in regions of perpetual frost. Vancouver's charts, from the extensive changes continually going on, present but little to recognise in this part at the present period.

ICY BAY lies to the N.W. of what was Point Riou. It is terminated by steep cliffs, from whence the ice descends to the sea. At the eastern side of the bay the coast is formed of low, or rather moderately elevated, land. Its West point is a high, abrupt, cliffy point, bounded by a solid body of ice or frozen snow.

This portion of the coast was visited by H.M.S. *Sulphur*, in her voyage round the world, in 1837, and the following are Sir Edward Belcher's remarks, made during that visit:—

"Icy Bay is very aptly so named, as Vancouver's Point Riou must have dissolved, as well as the small island also mentioned, and on which I had long set my heart as one of my principal positions. At noon we tacked, in 10 fathoms, mud, having passed through a quantity of small ice, all of a soft nature. The whole of this bay, and the valley above it, was now found to be composed of (apparently) snow-ice, about 30 feet in height at the water cliff, and probably based on a low, muddy beach; the water for some distance in contact not even showing a ripple; which, it occurred to me, arose from being charged with floating vegetable matter, probably pine-bark, &c.

"The small bergs, or reft masses of ice, forming the cliffy outlines of the bay, were veined and variegated by mud streaks, like marble, and, where they had been exposed to the sea, were excavated into arches, similar to some of our chalk formations. The base of the point named by Vancouver Point Riou probably remains; but being free, for some distance, of the greater bergs, it presented only a low sand, or muddy spit, with ragged, dirty-coloured ice, grounded. No island could be traced, and our interest was too deeply excited in seeking for it, to overlook such a desirable object.

"The current was found to set 1½ mile per hour, West, varying but slightly

in force, and not at all in direction. At this position we anchored in 50 fathoms, n. d., near Mount St. Elias; not a single drift tree was noticed. We were within the white water about 2 miles, which I am now satisfied flows from the ice, but why it preserves its uniformity of strength and direction is yet a problem to be solved."

MOUNT ST. ELIAS is one of the most remarkable features of North-West America. It is a noble conical mountain, rising far into the clouds, and although in a climate far from temperate, and of such an elevation as to lead to the conclusion that it rises far into the limits of perpetual snow, yet Sir Edward Belcher says:—"Its edges, to the very summit, present a few black wrinkles, and the depth of snow does not, even in the drifts, appear to be very deep. It stands, as it were, as before mentioned, upon the summit of the lofty range which runs parallel with the sea coast." Its elevation, according to angular measurement, is 14,987 feet above the sea, and even when visible at 150 miles distant, appears to be a majestic mountain. Its discoverer was the celebrated Behring, who made the coast here on the 20th of August, 1741, the name being applied from the saint to whom that day is dedicated. Its lat. is $60^{\circ} 18' N.$, long. $140^{\circ} 52' W.$

Pamplona Rock, &c.—According to some information given to Vancouver's party by the Russian officers he met here, there is a very dangerous rocky shoal, about 15 miles in length, lying by compass in a direction S. by W., 63 miles from a place called by them *Leda Unala*. This Mr. Puget conceived to be near the point called Point Riou. The Russian officer, Portoff, himself had been on the shoal, taking sea otters, and stated that the first discovery of it was owing to a Russian galliot having had the misfortune, some years before, to be wrecked upon it. Two of the crew were drowned, but the rest escaped in their boats. After that period an annual visit had been made to it, for the purpose of killing sea-otters, which were there met with.

From the Spaniards, also, Vancouver learnt that a very dangerous rock existed in this neighbourhood, the situation of which they had taken great pains to ascertain, and had found it to lie S. $41^{\circ} E.$ from Cape Suckling, at the distance of 26 leagues, and which was called by them Rock Pamplona. By this bearing it appears to lie E.S.E., 8 miles distant from the rocky shoal described by the Russians above; here it may be inferred that Portoff and the Spaniards intended the same shoal, though it is not stated by the latter to be so extensive as by the former.

It is without doubt dangerously situated for the navigation of this coast, and it may possibly have proved fatal to Mr. Meares's consort, Mr. Tipping, who, with his vessel, was never heard of after leaving Prince William Sound in 1786.

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A few leagues further to the westward is another small river, emptying itself into a shallow bay. Its entrance is obstructed by a bar, on which, with easterly winds, the sea breaks with great violence.

The coast between this and Cape Suckling shoots out into small projecting points, with alternate low, clifty, or white sandy beaches, being the termination of a border of low woodland country, extending some distance within, until it joins the foot of a closely united chain of lofty frozen mountains, which is connected with the same range that extends to the north-westward around Prince William Sound and Cook Inlet. From these low projecting points some shoals stretch into the ocean. Vancouver passed one of these at the distance of about 4 miles, sounding in 35 fathoms; it extends in a southerly direction, 2 miles from a low point of land that forms the West point of a bay, apparently very shoal. From the West point of this bay, in lat. $60^{\circ} 3' 30''$, long. $142^{\circ} 54' W.$, the shore towards Cape Suckling makes a small bend to the north-westward, but the general direction of the coast is nearly East and West, and appears to be firm and compact.

CAPE SUCKLING, so named by Cook in his third voyage, is conspicuous. Vancouver, differing much from Cook, places it in lat. $60^{\circ} 1'$, long. $143^{\circ} 41'$, but is considered by Raper as long. $143^{\circ} 54'.$ * The point of the cape is low, but within it is a tolerably high hill, which is disjoined from the mountains by low land, so that at a distance the cape looks like an island.

When near Cape Suckling, Captain Sir Edward Belcher says:—"Our attention was suddenly attracted by the peculiar outline of the ridge in profile, which one of our draughtsmen was sketching, apparently toothed. On examining it closely with a telescope, I found that although the surface presented to the naked eye a comparatively even outline, it was actually one mass of small, four-sided, truncated pyramids, resembling salt-water mud which has been exposed several days to the rays of a tropical sun (as in tropical salt marshes), or an immense collection of huts.

"For some time we were lost in conjecture, probably from the dark ash colour; but our attention being drawn to nearer objects, and the sun lending his aid, we found the whole slope, from ridge to base, similarly composed; and as the rays played on those near the beach, the brilliant illumination distinctly showed them to be ice. We were divided between admiration and astonishment. What could produce these special forms? If one could fancy

* It may be stated that the charts drawn up by Vancouver were found by Sir Edward Belcher to be plainly erroneous about this region. All his transit bearings and other observations indicated this. A river appears to flow near Cape Suckling, which has not been noticed.—Voyage of the *Sulphur*, vol. i, p. 175.

himself perched on an eminence, about 500 feet above a city of snow-white pyramidal houses, with smoke-coloured flat roofs, he might form some faint idea of this beautiful freak of nature."

Cape Suckling is a low neck, stretching out from a mountainous, isolated ridge, which terminates about 3 miles from it easterly, where the flats of the ice pyramids just alluded to terminate. Apparently the river or opening near Cape Suckling flows round its base. There is little doubt but that we may attribute the current to this outlet, arising probably, from the melting of the snow. We had less strength of current after passing this position. Immense piles of drift wood were noticed on each side of the opening, but none elsewhere.

Kaye Island, to the West and S.W. of the cape, is long and narrow. Its South point, named by Vancouver *Cape Hamond*, is very remarkable, being a naked rock, elevated considerably above the land within it. There is also an elevated rock lying off it, which, from some points of view, appears like a ruined castle. Towards the sea the island terminates in a kind of bare, sloping cliffs, with a narrow, stony beach at their foot, and interrupted with some gullies, in each of which is a rivulet or torrent, and the whole surmounted with a growth of smallish pine trees.

"Kaye Island, viewed from the eastward, presents the appearance of two islands. The southern is a high table-rock, free from trees and vegetation, and of a whitish hue; the other is moderately high land for this region, with three bare peaks, its lower region being well wooded.—(Sir Edw. Belcher, vol. i, p. 70.)

Wingham Island.—Off the N.W. point of Kaye Island is Wingham Island, and off its N.E. point, *Point Mesurier*, are some elevated rocks. Within these and to the N.W. of Cape Suckling, is *Comptroller Bay*, which is shoal, and extends 20 miles north-westward to Point Hey.

Wingham Island, which can be seen to nearly its whole length between Cape Suckling and Point Le Mesurier (the North part of Kaye Island), is moderately elevated, rising in three hummocks, which are bare on their summits. The southern, at a distance, owing to the lowness of the neck, appears separated. The whole is well clothed with trees.—(Sir Edward Belcher.)

PRINCE WILLIAM SOUND was first explored by Captain Cook in his last voyage.* Although this extensive inlet was before known to the Russians, the coast took him ten days to traverse, 11th to 21st of May, 1778, a week of which was spent in the inlet; but, from the subsequent survey of

* Prince William Sound, and particularly its N.E. part, was visited by Senr. Fidalgo, in 1790, for the purpose of inquiring into the nature and extent of the Russian establishments in these regions.

Captain Vancouver, it was found that no portion of his celebrated predecessor's labours were so defectively described and delineated as this, which leads to the supposition that some important authority has been omitted in the drawing up of the narrative, which would not have occurred had the unfortunate circumnavigator survived to superintend its publication. From the minute examination which was made of it by Vancouver, it proved to be a branch of the ocean that requires the greatest circumspection to navigate; and although it diverges into many extensive arms, yet none of them can be considered as commodious harbours, on account of the rocks and shoals that obstruct the approaches to them, or of the very great depth of water about their entrances.

The N.E. point of the coast, where the sound commences, is *Cape Witshed*, which is 43 miles from Point Hey, last described, the coast between being fronted by a very extensive mud-flat. The outward coast of the sound is formed by Hinchinbrook and Montagu Islands; between and to the West of which are the entrances to it.

HINCHINBROOK ISLAND is the north-easternmost of those before Prince William Sound. Its N.E. point, named *Point Bentinck*, is opposite to Point Witshed, a league asunder, the space between occupied by a low, barren, uninterrupted sand at low water, being a continuation of the sand-bank, extending from Comptroller Bay, and also along the coast to the N.E. of Point Witshed. It is dry at low water, but at high water it was stated that there is a boat channel, though Vancouver's party found the whole space occupied by a most tremendous surf, rendering any passage at that time impracticable. Cape Hinchinbrook, the S.W. point of the island, is 20 miles S.W. of Point Bentinck, and is placed by Vancouver in lat. $60^{\circ} 16\frac{1}{2}'$, long. (corrected) $146^{\circ} 27'$. In a direction S.W. $\frac{1}{2}$ S. 7 miles from the cape, is a barren, flat, rocky islet, with several rocks lying at a small distance from it. This lies, therefore, off the entrance to the sound between Hinchinbrook and the N.E. end of Montagu Islands.

Between Montagu and Hinchinbrook Islands Captain Sir Edward Belcher found shoal water, contrary to Vancouver's idea, rendering it necessary to anchor in 17 fathoms, the tide running at 3 knots.

Port Etches* is on the eastern side of the entrance into the sound, consequently on the eastern end of Hinchinbrook Island. The depth off the North point of entrance is very great; no bottom with 100 fathoms could be

* Port Etches derives its name from Richard Cadman Etches, a merchant, who, with others, entered into a trading partnership (May, 1785), under the title of the King George's Sound Company, for carrying on the fur trade on this coast, having procured a licence for this purpose from the South Sea Company. The voyages of Captains Portlock and Dixon, in the *King George* and *Queen Charlotte*, in and subsequent to 1785, were undertaken for this company.

found within a quarter of a mile of the shore. Off this point are some rocky islets, and there are some within the entrance (the *Porpoise Rocks*), and until these are past, there is no depth for anchorage. On the North side of the port is a lagoon (*Constantine Harbour*), within which was a Russian establishment, on a situation commanding the low narrow peninsula, and formed in 1793, when some ship building has been carried on.*

Port Etches was visited by H.M.S. *Sulphur*, in 1837. In the account of the voyage is the following:—"This establishment of the Imperial Russian Fur Company consists of the official resident, eight Russians, and fifty Aleutian and other allies. It is calculated to stand a tolerable siege, under determined hands.

Port Etches might furnish a most complete harbour, if vessels frequented these regions, or a station should ever be required in so high a latitude. The currents, however, between it and Montagu Island render it difficult of approach; and the Russian commandant stated that many sunken rocks (but perhaps of 10 or 15 fathoms) lie off Cape Hinchinbrook. Capt. Belcher's observations make Vancouver nearly as much in error in longitude as he ascribes to Cook

Phipps Point, the N.E. or opposite extremity of the peninsula, on which is the Russian establishment, is placed by Sir Edward Belcher in lat. $60^{\circ} 21' 12''$ N., long. $146^{\circ} 50' 15''$ W; high water, full and change, $1^h 15^m$; rise, $9\frac{1}{4}$ feet; variation, $31^{\circ} 38'$ E.

Hawkins Island is to the N.E. of Hinchinbrook Island, and is about 20 miles long, N.E. and S.W. On its southern side is the channel before mentioned, which is contracted by the sand-bank on the S.E. shore to a narrow, difficult channel against the southern shore of the island.

On the North side of Hawkins Island is *Port Cordova*, an arm extending from its N.W. point about 13 miles in an easterly direction. Within these limits are a bay and a small branch, in which are several rocks and rocky islets. These shores are in general low, ending in pebbly beaches, where shoal water extends some distance, and renders landing at low tide very unpleasant. To the northward is *Port Gravina*. The S.E. point of its entrance is placed by Vancouver in lat. $60^{\circ} 41'$.

Snug Corner Bay is on the N.W. end of the peninsula, separating Ports Gravina and Fidalgo. Its West point is in lat. $60^{\circ} 45'$, long. $146^{\circ} 35'$. Capt. Cook said it was a very snug place.

Port Fidalgo is so named after the Spanish commander who visited it in 1790. It extends in a winding direction to lat. $60^{\circ} 55'$, long. $145^{\circ} 48'$; its

* Upon Garden Island Capt. Belcher found a pine that was marked by Portlock, July 22, 1787, and was very nearly destroying it.—(Belcher, vol. i, p. 73.) At present the island is covered with pine trees, without many traces of the garden.

width being about 2 miles, and its length 28 miles. A small inlet runs in, 2 miles in a N.N.E. direction, at the N.W. point of Port Fidalgo, and S.S.W. $\frac{1}{2}$ W. $4\frac{1}{2}$ miles from its West point is the South end of Bligh Island. The shores are also rocky. Bligh Island is 7 miles long N.N.E. and S.S.W., and some islands off its North end form the southern side of the entrance to Puerto de Valdes.

Puerto de Valdes was so named by Senr. Fidalgo, and extends N.E. by N. for 12 miles, where a small brook, supplied by the dissolving snow and ice, flows into the arm, and from thence extends 5 miles in an East direction to its termination in shallow water. The port is from half a league to a league in breadth. Its West point is called *Point Freemantle*, and is in lat. $60^{\circ} 57'$, long. $146^{\circ} 49'$.

Southward of Port Freemantle is an island 7 miles long, in a S.W. by W. direction, and a league broad; within it is a passage half a league wide.

Westward of the island before mentioned is an arm extending about 4 leagues to the North, and terminating at the foot of a continuation of the range of lofty mountains. It is, in general, about a league wide, and its western coast terminates to the South, or *Point Pellew*, and from this the coast takes an irregular direction, about W.S.W. 10 miles toward the East point of a passage leading northward.

From Point Pellew a channel extends about 3 leagues in length, to the N.W. $\frac{1}{2}$ N. This in some places is a mile, and in others not a quarter of a mile broad; its West side formed by *Esther Island*. Four miles North from its further end is *Point Pakenham*, which is the S.W. point of Port Wells. This extends in a N.N.E. direction, and terminated in a firm and compact body of ice. Hence the coast pursues a southerly direction, 5 leagues to *Point Pigot*. The continent is here composed of a stupendous range of snowy mountains, from whose base low projecting land extends, jutting out into points, and forming the shores, which are thinly wooded with dwarf pines and stunted alders.

Point Pigot and *Point Cochrane*, opposite to it, form the entrance to *Passage Canal*. The principal branch extends from Point Pigot West 13 miles, and then S.W. by S. 4 miles further, terminating in lat. $60^{\circ} 48'$. Here the head of the inlet reaches within 12 miles of Turnagain Arm, at the head of Cook Inlet, hereafter described. The isthmus itself is a valley of some breadth, which, though containing elevated land, was very free from snow (in June), and appeared to be perfectly easy of access. By it the Russians, and Indians also, communicated with either of these extensive sounds. The other branch extends $2\frac{1}{2}$ leagues W.S.W. from Point Cochrane, which is $1\frac{1}{2}$ mile South from Point Pigot. Eight miles E. by S. from Point Cochrane is *Point Culross*. Off Point Culross is an island about a league from the shore, and about 4 miles long; and following the coast southward for 6 miles, we arrive at an opening about 2 miles wide. From the South point of the

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entrance, 11 miles along a shore broken into small bays, lined by innumerable rocks, and exposed to the whole range of the N.E. swell from the sound, brings you to *Point Nowell*, in lat. $60^{\circ} 27'$.

Between this coast and the ocean are a considerable number of large islands which lie generally in a N.N.E. and S.S.W. direction. The coast of the continent runs, but in a very irregular manner, in the same direction, to *Cape Puget*, in lat. $59^{\circ} 55'$, long. $148^{\circ} 3'$, this being the point where the shores of the main land form the seaward face.

From Point Nowell the main coast turns to S.W. $\frac{1}{2}$ S. for about 11 miles, to a point where an arm extends first N.W., and then terminates to the South, in a circular basin full of rocks. Before this coast is an island, following its direction at 2 miles distant, and $3\frac{1}{2}$ leagues long, forming a passage but full of rocks. Five and a half miles S.E. from the South point of the arm first mentioned, is *Point Countess*, in lat. $60^{\circ} 13'$. To the West is a bay about $4\frac{1}{2}$ miles deep, terminating in a compact body of ice that descended from high perpendicular cliffs to the water side. The coast southward of Point Countess forms the N.W. side of a narrow channel, 11 miles in length, in a S.W. $\frac{1}{2}$ W. direction. The North point of the southern end of this strait* is *Point Waters*; it has some rocks and breakers before it. This point is on the eastern side of *Port Bainbridge*, an inlet from the ocean, extending 18 miles in length from its entrance, in a North direction. From its being directly open to the ocean, although at this distance from it, the wind, when it sets up or down the channel, sends such a violent sea upon it, that landing is dangerous. *Point Pyke*, on the western side, is 6 miles from Point Waters. It is remarkable for its sugar-loaf form. S.S.E. 5 miles from Point Pyke, is *Point Elrington*, the south-eastern point of Port Bainbridge, and the south-westernmost part of a high, rugged cluster of islands. Opposite to Point Elrington is Cape Puget, before mentioned, on the main land.

The island of which Points Elrington and Pyke form a portion, is high and rugged, and about 6 leagues in length, in a general N.N.E. direction. *Lattouche Island* lies off its eastern side, separated by a channel half a league broad. Its northern point is named *Point Grace*. *Knight Island* lies to the northward of these, and is upwards of 9 leagues in length in the same direction; and beyond this, again, are some others of less dimensions.

Between this and Montagu Island is *Green Island*, so named by Cook, in May, 1778, from its being entirely free from snow, and covered with wood

* It was in this strait that Vancouver's party encountered a violent storm, June, 1794; a very heavy gust of wind brought down from a considerable height on the mountain side an immense mass of earth, trees, and frozen snow, which fell at a distance not exceeding a hundred yards from the assembled party. They observed in other places the effects of similar storms, which will serve as a warning to any one on those shores.

and verdure. The islands near the open sea are, as before stated, elevated and rocky; those within are low ones. Off the North point of Green Island, a league or a league and a half North, are some ledges of rocks, some above and others under water, making it very unsafe plying in this neighbourhood.

MONTAGU ISLAND is the largest and principal island of Prince William Sound, it being, according to Vancouver's survey, 46 miles in length, from S.W. by S. to N.E. by N.; its average breadth is about 2 leagues. Its South point is in lat. $59^{\circ} 46'$, long. $147^{\circ} 30'$. The passage on the inside, or to N.W. of the island, forms an entrance into Prince William Sound, between it and Latouche and Green Islands, of course varying in breadth. At 16 miles from the South end of Montagu Island is *Point Basil*, in latitude $60^{\circ} 1'$.

The two bays, one named by Portlock *Henning Bay*, and the other *M'Leod Harbour*, are stated by Mr. Whidbey to be very exposed anchorages, and nothing more than stopping places in navigating this channel.

M'Leod Harbour is 5 or 6 leagues within the S.W. point of Montagu Island. Its outer points, Point Bryant on the South, and Point Woodcock on the North, are about 2 miles apart, and joined by a bank of 7 or 8 fathoms, black sand and mud, within which is a depth of 21 to 12 fathoms. Within it takes a turn to the North, round a point which is quite bold-to, and may be passed close. A ship can lie in $4\frac{1}{2}$ or 5 fathoms water, with the South point of the bay just shut in with this point, at about a cable's length from the shore.—(*Portlock.*)

Port Chalmers, on the West side, and toward the North end of Montagu Island, is in lat. $60^{\circ} 16' N.$, long. $146^{\circ} 50' E.$ Vancouver says:—"The place of our anchoring in Port Chalmers can only be considered as a small cove, on a rugged rocky coast, very difficult of access or egress." *Stockdale Harbour*, too, is only a bay full of rocks, and of course not worthy of particular attention. The shores about Port Chalmers are in general low, and very swampy in many places, on which the sea appeared to be making rapid encroachments, the remains of the forests being seen below high water mark. Off the entrance to the harbour are several lurking rocks, which make its approach very dangerous, as before stated.

The South Passage Rock lies from the North point of the harbour West something less than a mile distant, and from the small woody islet, N. by W, $\frac{1}{2}$ W. about three-quarters of a mile. To the North of this is the North Passage Rock, lying from the North point of the harbour N.N.W. $\frac{1}{4}$ W. $2\frac{1}{2}$ miles distant, and W.S.W. three-quarters of a mile from Stockdale Harbour. These rocks must be carefully avoided, as they are not always visible.

It is high water at Port Chalmers about one hour after the moon passes the meridian; the current sets southward, and there is no draught into the

harbour. Springs rise 13 and 14½ feet, the night tides rising above a foot more than those in the day.

The strait between Montagu and Green Islands, to the northward of Port Chalmers, is embarrassed by a line of sunken rocks, which are very steep-to, affording no indication of their proximity by the lead. As this side of the island is greatly exposed to the prevailing winds, great caution ought to be observed in navigating near its shores.

From the N.E. point of Montagu Island its shores run compactly to the S.W. for 31 miles, to a low projecting point covered with wood. Off it lies a cluster of six rocky islets, chiefly composed of steep cliffs, nearly level on their tops, which may serve as a direction in thick or gloomy weather to the South point of Montagu Island, lying from them S.W. by W. ¼ W. distant 17 miles. They are tolerably well wooded, and are not liable to be mistaken, particularly for the Chiswell Isles (21 leagues to the West), because those appear to be entirely barren. *Resurrection Gulf* is to the northward of the Chiswell Isles.

The Chiswell Isles are a group of naked rugged rocks, seemingly destitute of soil and any kind of vegetation. The centre of the southernmost group is in lat. $59^{\circ} 31'$, long. $149^{\circ} 2'$. From this, the easternmost, which is a single detached rock, lies N.E. ¾ E. about a league distant; and the northernmost, which has several less islets and rocks about it, lies N. by E. ¼ E. 5 miles distant.

Blying Sound of the Russians, called by Portlock *Port Andrews*, lies within the Chiswell Isles.

To the south-westward of the Chiswell Isles the coast presents a broken appearance as far as *Pie Islands*, the South extreme of the southernmost of which lies in lat. $59^{\circ} 19'$, long. $149^{\circ} 51'$. This island, in several points of view, forms a conspicuous peak, and although not remarkable for its great height, yet from its singular appearance it is not likely to be mistaken in this neighbourhood, as it descends with great regularity from its summit to the water's edge. A group of rocks lying W. by S. ¼ S. 4 miles from it, must be very dangerous in thick weather, as it is probably covered at high water, spring tides.

Between *Pie Islands* and *Point Gore*, a distance of 18 miles, the coast is in most parts very mountainous, and descends rather quickly into the ocean. *Point Gore* is placed by Vancouver in latitude $59^{\circ} 11'$, longitude (corrected) $150^{\circ} 22'$. Towards the sea this projecting promontory terminates in an abrupt cliff, moderately elevated, and is connected to the main land by a low peninsula covered with trees. To the westward of the point is *Port Dick*.

CAPE ELIZABETH is the S.E. point of the mouth of Cook Inlet. It is placed by Vancouver in lat. $59^{\circ} 9'$, long. (corrected) $151^{\circ} 18'$. The coast here is composed of high land, before which lie three small islands and some

rocks. The cape is itself the largest of these, and the westernmost of them. To the S.W. of the middle isle is a cluster of rocks, both above and below the water's surface.

Port Chatham, so named by Vancouver from his tender, is situated behind the island which forms Cape Elizabeth, and from that promontory extends to a point in a N.E. direction $5\frac{1}{2}$ miles, and from thence it terminates in an excellent harbour, about 2 miles long from West to East, and 1 broad North and South, affording secure and convenient anchorage. The passage into it, passing to the N.W. of Cape Elizabeth, is free from all obstructions but such as are sufficiently conspicuous or easily avoided.

The Chatham anchorage, off an excellent run of water, was found to be in lat. $59^{\circ} 14'$, long. $150^{\circ} 56'$. The rise and fall of the tide, near the change of the moon, were 14 feet, but during neap tides not more than 10 or 11 feet. High water about an hour after the moon had passed the meridian; but greatly influenced by the form and direction of the winds. The Russian establishment, *Fort Alexandroffsk*, is in a bay to the westward of Port Chatham.

The **KENAY PENINSULA** separates the two extensive inlets called Prince William Sound and Cook Inlet. There were several Russian establishments on its shores, and it is inhabited by a tribe which has given the name, Kenaians, to all the Indians North of the Copper River, and West of the Rocky Mountains, except the Aleutians and Esquimaux. They are a proud and fearless race, but are represented by the Russians and those employed by the Telegraph Company, as peaceable and well disposed. But they are always ready to resist any affront or wrong.

COOK INLET.

This extensive arm of the ocean was discovered by Captain Cook, in 1788, but he explored it imperfectly, supposing that it was much more extensive than it was found to be by Vancouver in 1794. Cook thought that it was the estuary of a great river, and as he did not name it, Lord Sandwich directed that it should be called *Cook's River*; but when Vancouver penetrated to its head, he properly called it *Cook's Inlet*.

Point Bede, so named by Cook, May 26, 1788, is a lofty promontory, and from this the coast trends N.E. by E., with a chain of mountains inland extending in the same direction. The land on the coast is woody, and there seemed to be no deficiency of harbours.

Graham Harbour is 7 miles from Point Bede. The entrance, according to Portlock's sketch, is between Russian Point on the South, off which a rocky shoal dries at half ebb nearly $1\frac{1}{2}$ mile out, and Coal Bay on the North 4 or 5 miles apart. In the entrance is Passage Island, on either side of which is an open channel. From this it runs up about 9 miles to the E.S.E., and

terminates in a fresh-water river. There are several projecting points on each side of the harbour, that form very good and snug bays, where a ship might if necessary be hauled on shore in the greatest safety.

Coal Bay on the North side, to the East of the North point, is a pretty good one, carrying soundings in 14, 12, and 8 fathoms, fine black sand.

Cpts. Portlock and Dixon landed on the West side of the bay, and in walking round discovered two veins of *cannel coal*, situated near some hills just by the beach, about the middle of the bay, and with very little trouble several large pieces were got out of the bank.

The best time to run into this harbour is as near low water as possible. Whatever danger there is may then be seen, either from beds of kelp, or the rocks showing themselves above water.

CHUGACHNIK, or Tschougatschouk Bay, lies to the N.E., and its N.W. extremity is *Anchor Point*, in lat. $59^{\circ} 39'$; and hence, according to Vancouver's chart, the coast pursues a nearly straight direction 60 miles to the Russian establishment, 8 miles to the S.E. of the East Foreland.

The S.W. limit of Cook Inlet may be placed at *Cape Douglas*, in lat. $58^{\circ} 52'$, long. $152^{\circ} 51'$. The coast hereabout is composed of a low tract of country, stretching from the base of very lofty mountains, wrapped in snow, (May, 1794). Off the cape, a few miles to the northward, lies a very low flat island, *Shaw Island*, off the N.E. point of which is a ledge of rocks. To the northward of the mountains that form the promontory of Cape Douglas, is a lofty, rugged ridge, firmly connected by land less elevated, and forming a deep bay between the cape and the lower borders of Ouchouganat Island, or Mount St. Augustine. The shores of this bay, *Bourdieu Bay*, in most directions seem compact, but encumbered with large rocks and stones; the depth of water across it North and South is from 9 to 12 fathoms.

OUCHOUGANAT ISLAND, or Mount St. Augustine, is a very remarkable island, rising with a uniform ascent from the shores to its lofty summit, which is nearly perpendicular, to the centre of the island, inclining somewhat to its eastern side, and being in lat. $59^{\circ} 22'$, long. $153^{\circ} 0'$. It is about 9 leagues in circuit, and forms a lofty, uniform, conical mountain, presenting nearly the same appearance from every point of view. The width of the passage between it and the main land is about 6 miles.

Advancing northward along the shores of the main land, it will appear indented and broken into small coves and bays. In lat. $59^{\circ} 42'$ are three islets, against the shore, behind which there is appearance of anchorage and shelter. There is nothing remarkable on the coast* until we come to the

* The weather now (April 18, 1794), though extremely cold (the mercury standing at 25°), was very cheerful, and afforded us an excellent view of the surrounding region, composed, at a little distance from the river, of stupendous mountains, whose rugged and ro-

northward of lat. 60° , where there are two openings, the northern of which is the principal. It runs to the West, and then S.W. towards the foot of a conspicuous volcano, *Iliaminsk Peak*, 12,066 feet high, which lies in lat. $60^{\circ} 6'$, long. $152^{\circ} 36'$.

From the mouth of this opening to the West and East Foreland, where the breadth of Cook Inlet is considerably contracted, the distance is 43 miles, the distance between its shores at this part being about 30 miles. In the intermediate space lies an island, named by the Russians *Coulgiak Island*, which divides the inlet here into two channels, the N.W. of which is much encumbered by dangerous and extensive shoals. The island itself is about 13 miles long, nearly N.E. and S.W., and is narrow. Vancouver landed on it, on the South point of a shallow bay on its N.W. side, towards its S.W. extremity. The snow, which was lying very deep on the ground (April 17, 1794), confined their walk to the beach, on which was lodged some small drift wood, and on it they found some pieces of coal, resembling cannel coal. The more important part of this island to the navigator is a dangerous shoal which extends, in its direction from the S.W. end, for the distance of at least 2 leagues. From the great variety of soundings on passing over it, it appears to be very uneven, as in several instances the ship struck violently on some detached pieces of rock, so that it is infinitely more dangerous than a mere spit of sand.

Ahead of the S.W. point, on the West shore, is *Point Harriet*, which is a moderately high steep cliff. Off the point a shoal extends a league off, on the outer edge of which is only 3 fathoms. To the N.E. of this again, the channel between the island and the western shore has some extensive shoals. It is between 6 and 7 miles from the main land, and is near a league from the West side of the island.

Beyond this the shores of Cook Inlet are comparatively low, or only moderately elevated, jutting out into three remarkable steep cliffy points, named the East, West, and North Forelands; the two former forming the Narrows.

The *West Foreland* is in lat. $60^{\circ} 42'$, long. $151^{\circ} 12'$, and is about $8\frac{1}{2}$ miles nearly due West from the East Foreland.

A rock, that is visible only at half tide, lies about the fourth of a mile from the extremity of the point.

mantic forms, clothed in a perpetual sheet of ice and snow, presented a prospect, though magnificently grand, yet dreary, cold, and inhospitable. In the midst of these appeared the volcano, near the summit of which, from two distinct craters on its south-eastern side, were emitted large columns of whitish smoke, unless, as was supposed by some on board, it was vapour arising from hot springs in that neighbourhood; but how far this conjecture was consistent with the severity of the climate at the top of that lofty mountain, is not within the limits of my judgment to determine.—*Vancouver*, vol. iii, p. 100.

Between the West Foreland and the North Foreland, both of which are on the western shore, the coast forms a spacious open bay, called by Portlock *Trading Bay*. At the head of this was a Russian establishment.

The S.E. shore eastward of the East Foreland forms a shallow bay, between it and a point 6 miles N.E. by N. above it, with soundings of 7 and 8 fathoms within a convenient distance of the shore, sheltered from the East and South quarters. Beyond this point, and between it and a point lying 7 miles W.S.W. from Point Possession, a distance of 21 miles, the outer bank forms a perfect labyrinth of conical rocks, detached from each other on a bank of sand and small stones, extending a league and a league and a half from the shore. These rocks are of different elevations, and few of them are of sufficient height to appear above high water level. This very extraordinary rugged region appears to join to the southern side of the shoal on which Cook's ship, the *Resolution*, grounded in 1778. This shoal extends half way over the strait, and its outer end is about 9 miles nearly N. from the East Foreland.

The North Foreland is in lat. $61^{\circ} 4'$, long. $150^{\circ} 35'$, and on it Vancouver found the Russian factory. For 2 leagues to the North of this, along the western shore, tolerable anchorage is found. But this space is greatly exposed to the East and S.W. winds, the prevalent and most violent in this country.

Turnagain Island lies at the head of the more extensive part of Cook Inlet. Its West end is in lat. $61^{\circ} 8'$. It is about $3\frac{1}{4}$ miles long, E.N.E. and W.N.W., and half a league broad. The island lies in the entrance of a branch diverging from the main inlet in a N.E. direction. Its entrance lies between *Point Mackenzie* on the North, and *Point Woronzow* S.W. by S. 2 miles from it. Cook's vessel penetrated this inlet a short distance, but left its termination undiscovered. Vancouver anchored 5 miles above its entrance and found that all above him became, at low water, a succession of dry sand-banks, occupying the whole of the space up to its head, 18 miles further on, in lat. $61^{\circ} 29'$, long. $148^{\circ} 55'$. At high tide it becomes an extensive sheet of water.

Turnagain Arm.—The southernmost branch is the principal. It was called by Cook *Turnagain River*, and by Vancouver *Turnagain Arm*, he having decided its real character. Its entrance lies between *Point Campbell*, which is S. by W. $\frac{1}{2}$ W. 4 miles from Point Woronzow, and *Point Possession* on the southern shore. At 14 or 16 miles above these the shores converge again, up to which points they are 3 or 4 leagues asunder, but they cannot be approached on account of the shallow flat.

The tide here rises 13 feet perpendicularly, so that at low water the remaining portion of the arm is dry, or nearly so. It extends 22 miles above these points, and thus approaches to within 4 leagues of the head of Passage Canal, in the N.W. part of Prince William Sound, described on page 482.

Across this isthmus the Russians and Indians communicate with these two extensive inland waters, as there mentioned.

The time of high water in the N.E. arm is about six hours after the moon passes the meridian, and the rise and fall at springs is estimated at about 27 feet.

THE KODIAK ARCHIPELAGO.

The **KODIAK ARCHIPELAGO** was first seen by Behring, on his voyage of discovery, on returning from the American coast, in 1741. They were seen in 1763 by the Russian merchant Glotoff. In 1768 Chelighoff took possession of them in the name of a company of merchants for the trade in furs, of which he was the chief; and, in 1799, they were granted in full possession to the Russian American Company.

The archipelago is composed of two principal islets, Kodiak and Afognak, and several smaller islets in their neighbourhood.

Kodiak (or Cadiak, as it is called by Lisiansky) is very mountainous, and surrounded by deep bays, into which a number of deep rivers fall. The country is in general too elevated for settlement, and is, besides, for the greater part of the year, covered with snow. The climate is by no means agreeable; the air is seldom clear, and even in summer there are few days which may be called warm; the weather, indeed, depends entirely on the winds; so long as they continue to blow from the North, the West, or the South quarter, it is fine; when from other points of the compass, fogs, damps and rain are sure to prevail. The winters very much resemble what is felt in Russia in a bad autumn, which is, however, not without exceptions.

The native animals are few, consisting of bears, foxes, ermines, &c. Birds are much more numerous, both in numbers and variety. Kodiak also abounds in fish, which are halibut, cod, flounders, &c., and salmon, which last come into the rivers, from May to October, in great abundance. The marine animals were formerly much more numerous, but from the indiscriminate slaughter they have been much thinned. Fur seals were formerly one of the staple products of the group. But the article for which it is now best known is ice, which is carefully prepared for the Californian and other markets in the bay of St. Paul.

The population is small, compared with the size of the islands; they were estimated at a total of 4,000 by Lisiansky, in 1805. It was stated that, previous to the arrival of the Russians, it was more than double this. Chelighoff stated that he subjected 50,000 men to the crown of Russia, which is manifestly an exaggeration. They are a family of the Aleutians, resembling, in many respects, the Southern Esquimaux. They are generally kind and well disposed, and not entirely wanting in industry. By the introduction of

schools and churches among them, the Russians have done much toward reducing them to a state of civilization.*

KODIAK, as before stated, is high, hilly, and very much intersected. Its greatest diameter is about 30 leagues in a N.E. and S.W. direction, and its breadth may be assumed as 15 leagues. The shore, on all sides of the island, is indented with a great number of large and deep bays, which contain excellent harbours. That of Chiniatskoy is the largest, and at the same time the most important; for it is in the bottom of this bay that the establishment of the Russian-American Company, formerly the principal in the Pacific Ocean, lies. This is the town and harbour of St. Paul. It is, therefore, the only port frequented by strangers, and we shall be more particular in its description.

CHINIATSKOY BAY is formed by the cape of that name on the South, and Long or Barren (Sterile) Island on the North, an opening of 8 miles in a N. $\frac{1}{4}$ W. and S. $\frac{1}{4}$ E. direction. It is 6 miles deep, and its S.W. portion is filled with rocks.

The frequent and lasting fogs which occur here would render the approach to this bay very difficult, if it were not for the island named Ougak, lying 15 miles South of Cape Chiniatskoy, and $2\frac{1}{4}$ miles from the land. This being the only island on the East coast to the South of the bay, it becomes an infallible point of recognizance on approaching it.

The Harbour of St. Paul is excellent in every respect; the depth 5, 6, and 7 fathoms, good holding ground. Properly speaking, it is a narrow channel, formed by Proche Island, which will hold but few vessels at a time. The outer road is equally well sheltered and secure. Captain Golownin's directions follow.

The port of St. Paul has two entrances; one from the South, by the Bay of Chiniatskoy; the other, from the North, passes through the outer road. Neither are dangerous if the wind be favourable, and the weather sufficiently clear to distinguish the shores around the port; but it should not be approached during the night or in fog, for there are no lights, and the currents may carry you easily on to the shoals and rocks, which are abundant on all sides.

As soon as you have cleared Cape Chiniatskoy, you find before you a rock called *Gorbun*; steer N.W. $\frac{1}{4}$ W. or N.W. $\frac{3}{4}$ W., true, and you will soon see ahead a small high island, *Toporkowa*, upon which you must be careful to direct your course. This island will show you the direction of the current;

* Many particulars of the group, in addition to those contained in the accounts of the Russian discovery by Dr. Coxe, and Pallas, will be found in Lisiansky's Voyage, chapter x. p. 190 *et seq.*; Billing's Voyage, by Martin Sauer; Langsdorff's Travels; Cook's Third Voyage, vol. iii.; and Vancouver's Voyage, vol. iii. These will give a good idea of the condition and resources of this inhospitable country.

steer right upon it, leaving to starboard *Barren Island*, and then the channel which separates it from another called *Woody Island*. When abreast of the South point of the latter, which may be readily known by the rocks surrounding it, bear to the North, ranging along the western shore of *Woody Isle* as near as possible, paying attention to the soundings, which diminish regularly on either side up to the entrance of the port. Following these directions, if the wind be not contrary, and carrying short sail, you may pass, without a pilot, the shoals on the western side near two isles, and reach the entrance of the port.

If, after passing along the West coast of *Woody Isle*, the wind or other obstacles prevent an advance, you may anchor in perfect security until the weather becomes more favourable. In case a vessel may have entered the bay, and the wind will not allow her to follow the foregoing route, and it is absolutely necessary that she should reach the port, she will find a good shelter very near *Steep Cape*, on the western side of the bay. In this case, after nearing the *Gorbun Rock*, run directly for this cape, or to W. $\frac{1}{2}$ N., until a remarkable jutting point bears W.N.W.; it is readily distinguished on this low coast by its elevation, and its peaked form. As soon as *Steep Cape* is passed, change the course towards the starboard, to anchor under *Toporkowa Island*, from whence you may readily reach the harbour, either under sail or by towing.

To enter the Harbour of St. Paul by the southern passage, steer for *Cape Pine*; then, being near to this cape, which ought to bear N.W., distant a mile or half a mile, run into the middle of the channel between *Kodiak* and *Woody Isle*, carefully observing not to go into less than 18 or 20 fathoms depth, steering directly for the islands before mentioned, and to the West of *Woody Isle*, until the town of St. Paul is seen; you may then enter the port itself, or rather anchor in the outer road. The best anchorage is under *Woody Isle*, in 13, 14, or 15 fathoms, sand. Nearer the port the bottom is of mud, but here you are not so well sheltered as under *Woody Isle*.

If you wish to enter the port under sail, you must take care of the contrary current, or have good cables; the breadth of the harbour not allowing you to bear up, you must drop anchor when under way. In the summer it would be better to anchor in the road, mooring in the direction of the tides, the flood running to N.E. and the ebb to S.W. The starboard anchor ought to be laid towards S.W., and the port N.E., having an open hawse for N.W. and West winds, which blow strongly and in gusts. The tides change regularly every six hours.*

* The ice company before alluded to was at San Francisco, and they leased from the Russian-American Company the privilege of obtaining ice from St. Paul's. This concession was the subject of a special clause in the treaty, and there is no doubt but that the place will be fully utilized by the new proprietors for such an essential article. The ice was cut

Igatskoy or Ighakehi Bay.—To the South of Cape Greville, or Tolstoy (great) is Cape Tonkoy (small) of the Russian charts. It forms the N.E. point of *Igatskoy*, *Igakchi*, or *Ihak Bay*, a deep inlet of 16 miles to the West, but only $2\frac{1}{2}$ miles in breadth. There are some good harbours in it, especially one lying in the S.W. part of it. In the bay the Russian-American Company had an establishment. In entering the bay keep close to the South shore, the North is bestrewn with rocks.

Twelve miles to the South from Igatskoy Bay is *Kiludenskoy* or *Kiluden Bay*, where the company also have an establishment. It is properly composed of two bays, either of which afford shelter.

In the S.E. part of Kodiak, to the South of the last-named bay, lies *Saltchidak* or *Siachladak Island*, which is nearly 20 miles broad S.W. and N.E. *Cape Barnabas* of Cook is the N.E. point of this island.

Two-headed Point is on a small island, at 8 miles S.W. by W. $\frac{1}{2}$ W. from the S.W. point of *Saltchidak Island*, and is the northernmost of four isles that must be doubled before entering the Port of the Epiphany. *Epiphany Bay* is small, only a mile in circumference, and 60 yards in the opening. The depth is 10, 8, 7, and $4\frac{1}{2}$ fathoms, muddy bottom.

The southern point of Kodiak was called by Cook *Cape Trinity*. At $11\frac{1}{2}$ miles S. of Cape Trinity lie two isles, named by Cook *Trinity Isles*; they are so close together that they might almost be considered as one island; together they are 12 leagues in length, East and West, and 2 or 3 leagues from the coast. On the Russian charts the eastern is called *Sitchunak*; the western, *Tugidak*.

To the North of Cape Trinity is *Alitok Bay*, where the company have an establishment; the westernmost point of Kodiak, *Cape Ykolik*, in $57^{\circ} 14' N.$, lies N.N.W. $\frac{1}{4}$ W. 38 miles from Cape Trinity; and at 18 miles N.E. of it is the company's establishment, named *Karlouk*. It is from here that the *baïdares* destined for the opposite shore depart, the strait of Chelighoff being narrowest here.

At 12 miles to the North of Karluk is *Oonjak* or *Ohiak Bay*. It is a deep indentation, extending 27 miles in a S.S.E. $\frac{1}{2}$ E. direction, the distance between its head and that of *Kiludenskoy Bay*, on the opposite side of Kodiak being only 8 miles.

The N.W. point of Kodiak is in about lat. $57^{\circ} 28'$, and 2 miles from this point lies the extreme of North Island, which extends 15 miles N.N.W. and E.N.E. This is separated by a narrow channel from *Afognak Isle*.

The northern coast of Kodiak, North Island, and the South part of

from an artificial lake, which had an area of about 40 acres. The labourers were all natives of the Aleutian Islands, and were principally engaged for three or four months of winter while the ice is firm, in cutting it up and storing it for summer consumption. From this it was exported to every part of the Pacific.

Afognak, form a channel 20 miles long and 2 wide, in which 16 to 20 fathoms water is found.

Chelighoff or Chelekhoff Strait.—Cook called the North entrance of Chelighoff Strait Smoky Bay. It separates Kodiak from the continent North of the peninsula of Aliaska, and derives its name from the Russian commander who first brought the inhabitants of the adjoining countries under subjection.

In 1832 it was examined and surveyed by Mr. Wassilieff, an officer of the Russian navy, in the service of the Russian-American Company. This showed that the strait is narrower than was at first supposed.

Cape Douglas, which has been before described, is the north-west limit of the strait. A great number of bays appear to offer good shelter; that called *Poualo*, in lat. $47^{\circ} 46'$, long. $155^{\circ} 0' W.$, is 5 miles distant from the great lake *Nanouantoughat*, from which the *River Ougagouk* flows. This river has been adopted by Krusenstern as the northern limit of the peninsula of Aliaska.

The coast of the Peninsula beyond this is described in the next Chapter, with those of the Sea of Behring which it encloses.

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CHAPTER IX.

THE ALEUTIAN ISLANDS. BEHRING SEA.

THE extensive and inclement sea, whose eastern shores and islands are described in the present chapter, derives its name from the celebrated navigator who first sailed in it, and made known to Europe the real character of the extremities of the New and Old Worlds.

The appellation of the Sea of Behring was first and justly applied to it by Captain Golownin. This replaced those by which it had been improperly designated, such as the Sea of Otters (*Bobrovské*), the Sea of Kamtschatka, of Alaska, or the Aleutian Sea.

The new Government of the United States may do something to develop its resources, which hitherto have been confined to a few fur-trading posts of the Russian-American Company, and therefore there has been but little inducement for a more minute examination of its shores than that given in the imperfect charts drawn up by Lütke and others. But the United States' whale fishery in this sea, as presently mentioned, has afforded, in former years, a most lucrative occupation for a large fleet. A brief account of the progress of our knowledge of this distant region will also shew the degree of authenticity our descriptions may claim.

The Russian Czar, Peter the Great, to whom the possession of the half of a great continent still seemed not sufficient, drew up with his own hand, shortly before his death, the instructions for a voyage whose object was to ascertain whether Asia was separated from America by a strait, and then to extend the Russian dominion beyond such a limit, should nature have thus marked it.

But in the distant regions of this vast empire there were no means by which such an exploratory voyage could be organized. They were therefore sent from Russia. Vitus Behring and Alexoi Tschirikoff were chosen by the Empress Catherine to execute this part of the will of her great partner and predecessor in power. The two ships destined for this expedition were con-

structed at Kamtschatka, the first of their kind that had been seen in this the extremity of a land then scarcely known. They did not set sail from the mouth of the Kamtschatka River until July 20th, 1728. Behring shaped his course to the N.E., never losing sight of the Asiatic coast. On August 15th he reached lat. $67^{\circ} 18' N.$, at a point (now Cape Serdze Kamen) where the coast turned to the westward, from which he returned to the port whence he sailed, without having seen the American coast. He had thus entered the Icy Ocean without knowing it; he had solved the great problem, and posterity has imposed the name of Behring upon this strait; the reality supplying the place of the fabulous Strait of Anian.

Behring and Tschirikoff made a second voyage in 1729, but it yielded no new information.

A third time did the same commanders set sail from Kamtschatka, June 4th, 1741; this time with the intention of making the American continent to the eastward. Behring then sailed through the chain of islands skirting the great peninsula of Aliaska. On August 29th he anchored at the Schumagin Islands. In the course of the next month he discovered part of the Aleutian Islands. By this time the commander was ill and decaying. The greatest part of the crew, too, were attacked by that frightful disease, scurvy.

Behring's ships and crew were reduced to the greatest distress by the weather and sufferings they encountered. Worn out with these, they made for the island now bearing his name; but the ship was stranded. On Nov. 9th the captain himself was brought on shore on a hand-barrow, and died on December 8th, 1741. "He was a Dane by birth, and had in his youth made voyages to the East and West Indies, when the glorious example of the immortal Emperor Peter the Great for marine tempted him to seek his fortune in Russia. It is a pity that it was his fate to end his life in such an unfortunate manner. He may be said to have been buried half alive, for the sand rolling down occasionally from the side of the ditch in which he lay, and covering his feet, he at last would not suffer it to be removed, and said that he felt some warmth from it, which otherwise he should want in the remaining parts of his body, and thus the sand increased to his belly; so that, after his decease, they were obliged to scrape him out of the ground, in order to inter him in a proper manner."—(Müller.)

Tschirikoff's voyage was less unfortunate than his commander's; but he scarcely had fewer hardships. He returned to Russia, after having explored part of the American coast.

Such was the success of the first Russian expeditions. They were followed at intervals by many others, among which the names of Glotoff, Synd, Krenitzin, and Levachoff, stand most conspicuous.

Our great navigator, James Cook, entered the Icy Ocean, and ascertained the exact nature of the continental separation first traversed by Behring in August, 1778; and his second in command, Captain Clerke, after his sad

catastrophe at Hawaii, again penetrated to the icy barrier in July, 1779. The abortive Russian Expedition under Commodore Joseph Billings, an Englishman, made by order of the Empress Catherine II., in 1785 to 1794, did not penetrate the strait, one great object of the expedition, after having traversed the Sea of Behring. In 1817 Captain Otto von Kotzebue examined and named most of the points on the American coast of Behring Straits.

The Asiatic coast, from East Cape to Kamtschatka, is amply described from the admirable survey and examinations of Rear-Admiral Frederic Lütke. In 1826 the Russian corvettes, the *Moller*, Capt. Stanikowitch, and the *Semiavine*, under Capt. Lütke, were despatched to these seas, and examined almost the whole of the western shores, and to the account of this voyage we owe our descriptions.

To our own country we are indebted for the accurate knowledge we possess of the American shores. This is from the memorable voyage of H.M.S. *Blossom*, under Admiral F. W. Beechey, who minutely surveyed the eastern shores of the strait in 1826-7.

The vessels employed in the Arctic searching expeditions in 1846-54, in quest of intelligence of the party under Sir John Franklin, added something to our knowledge of the Aleutian Islands and the northern harbours. H.M.S. *Herald*, under Captain (now Admiral) Kellett, the *Plover*, under Commander Moore, and the expedition in the *Enterprise* and *Investigator*, under Captain (now Admiral) R. Collinson, in 1850, with others, may be specially noticed. But the account of the progress of these noble efforts belong to other subjects.

The latest expedition to this remote land is probably the most wonderful of all in its origin. Before the solution of the great problem solved by the successful laying of the Atlantic Electric Telegraph Cable, in the summer of 1867, the importance of telegraphic communication between America and Europe, led to the project started by Mr. P. D. Collins, of an overland connexion from San Francisco, across Behring Strait, and thence through the Russian empire to Western Europe. In 1865 the Western Union Telegraph Company of America, the largest corporation of its kind in existence, commenced the explorations of the proposed line, which was to go from the Fraser River to the upper course of the Yukon River, thence down its course to Norton Bay; thence across to the Asiatic shore, down which it was to be carried to the mouth of the Amoor River, to which the Russian Government have completed their telegraph system. This gigantic undertaking was placed under the command of Colonel Bulkley, U.S. army, and employed several hundred explorers for nearly 2½ years, who examined 6,000 miles of country on both sides of the Pacific, and constructed a large portion of the line. When the intelligence reached the parties of the success of the Atlantic cable, this grand enterprise was at once abandoned, after an ex-

penditure of three millions sterling. The narrative of Mr. Fredk. Whymper, who was attached to the Yukon party, is one of the most interesting works on the Pacific, and has been before quoted in this work.*

The *whale fishery*, as before stated, is a very important feature of these Arctic Seas. All the early voyagers speak of the vast abundance of fish of all varieties, and specially of the whale. But it does not appear that this fact was much utilized till California came in the ascendant, when Captain Boys, in his ship *Superior*, penetrated the Arctic Ocean through Behring Strait, in the summer of 1848. In that and the following two years *three hundred* whale ships came here, and brought home oil and whalebone worth nearly 17½ millions of dollars. Such a vast result could not be obtained for a series of years, but still the fisheries of cod, halibut, salmon, as well as of the whale, are of the greatest value.

Of the people and other subjects a few words will be given hereafter. But it may be premised that the geographical descriptions are imperfect, and cannot be trusted in the same degree as those which precede this, but this is of the less importance, as these seas are rarely traversed except by those who are more or less intimate with its navigation.

The **PENINSULA of ALASKA** separates Behring Sea from the Pacific. It is a remarkable tongue of land extending from the River Ougagouk, mentioned on page 497, to the Strait of Isanotzky, separating it from Ounimak, the easternmost of the Aleutian Archipelago, an extent of 330 miles; its breadth diminishing from 90 miles in the North to 25 miles in the southern parts. Its name (signifying "the land") has been applied by the Americans to the whole of their new territory.

From its configuration it may be regarded as a continuation of the Aleutian Islands. The first authentic notice of its shores was that given in the account of the third and disastrous voyage of Captain Cook, who examined, though but very slightly, both sides of the peninsula at different points. The southern side remained in the same imperfect state until the examination, previously noticed, by Capt. Wassilieff in 1832. Its northern side, of which we shall speak hereafter, is somewhat better known.

From the *Bay of Poulou*, the north-eastern limit of the peninsula noticed above, Capt. Wassilieff's examination extended to a large bay in lat. 56° 40', and abreast of the Evdokeeff Islands. This bay has been named *Wassilieff Bay*. The space between Poulou Bay and this point contains a great number of bays, and all along the coast are numerous islands, of which we have no especial description.

The **Evdokeeff Islands** were discovered by Behring on August 4th, 1741, and named by him in honour of the saint of the day. They form a group

* *Travel and Adventure in the Territory of Alaska, &c.*, by Frederick Whymper, London, 1868.

of seven islands, the three largest of which are called *Simidin*, *Alexinoy*, and *Ageach*. Capt Golownin determined the position of the southernmost island of the group as lat. $56^{\circ} 0' N.$, long. $156^{\circ} 22' W.$

A rock is marked on the charts to the S.W. of the Island of Simidin, in lat. $55^{\circ} 50'$; evidently a different position to those recorded by Cook as having been seen June 16, 1778, a cluster of small islets, or rocks, lying about 9 leagues from the coast, which would be in about lat. $56^{\circ} 3'$, and long. $158^{\circ} 0' W.$

St. Stephen Island, of small extent, is supposed to have been discovered and thus named by Behring. Krusenstern places it in lat. $56^{\circ} 10' N.$, long. $155^{\circ} 30'$. There is some confusion here respecting the discoveries of Behring, Tschirikoff, and Cook.

Oukamok or *Tschirikoff Island* was probably discovered by Vancouver, April 4th, 1794, and named by him after the companion of Behring. It appeared to form a somewhat irregular, four-sided figure, about 10 leagues in circuit, having from its western part, which is low and flat, and which had the appearance of being insular, a remarkably high, flat, square rock, lying in a direction S. $66^{\circ} W.$, at the distance of 2 miles, between which and the island is a ledge of smaller rocks. Its S.E. parts, consisting of high, steep cliffs; but on its western side, which is considerably lower, this appearance was not so general.

SCHUMAGIN ISLANDS.—This group, which is the next considerable collection West of the Evdokeeff group, according to Captain Lütke, is composed of fifteen islands, and seven smaller islets. They received the name of Schumagin (Choumaguine) from Behring, in memory of one of his sailors who was buried here. The two largest islands of the group are *Ounga* and *Nagay*. The first extends 12 leagues from North to South, with a breadth of 7 leagues; its northern extremity in lat. $55^{\circ} 42'$. Nagay Island, with a similar direction, is 8 leagues in length. Besides the Ounga and Nagay Islands, Sarytscheff names those of *Kagai*, *Sajouliucktusigh*, *Nuinak*, *Tagh-Kiniagh*, and *Kiuniutchny*; all these, and several others not named, lie very close together. Kagay Island, according to Sarytscheff, ought to be placed in lat. $55^{\circ} 5' N.$, long. $160^{\circ} 33' W.$ The state of our knowledge respecting this group may be summed up in a few words,—it is very imperfect and unsatisfactory. There is no apparent analogy between the remarks of any two observers. Under these circumstances we shall confine our extracts to that of the Ounga Island, on account of the fact of coal existing on it.

Ounga is the largest of all, and the westernmost of the group. According to the observations of *Stépanoff*, of the Russian Company, its North extreme is in lat. $55^{\circ} 37'$, that of its South part $55^{\circ} 11'$, and its length about 26 miles. Its breadth is about half its length. This island is mountainous and clifty, particularly on its South coast, but the N.W. side extends in a plain, which terminates in the low cape called *Tonkoi*. The island has three

bays; the largest, *Zakharovskaia*, is on the N.E. side; it is open to the N.E., but the anchorages may be kept; here the vessels of the company formerly wintered. The second, on the East side, penetrates considerably into the land, but it has but very little water. On this bay stands a village, called by the Russians *Delarovskoi*, and by the Aleutes, *Ougnagak*. The third is on the South coast.

On the West side of *Zakharovskaia* Bay, there are, in two places, some beds of coal, arranged in perfectly horizontal strata, at 100 yards above the level of the sea. They have been worked.*

Between the Schumagin Islands and the western extremity of Alaska, the coast is bordered with a large number of small islands. Admiral Sarytscheff, who passed here, says in his journal that eight of them, of which he gives the names, are larger than the rest.

Nanimak Island, nearly the westernmost, is 4 leagues to the North of *Sannagh* (presently described). To the S.E. of it lie a quantity of small islets and rocks above water. *Animak*, or *Reindeer Island*, lies 6 miles to the North of *Nanimak*. To the S.E. and East of this island there is a group of rocks and islets similar to those projecting to the S.E. from *Nanimak Island*. *Lialiuskigh* lies to the N.E. of *Animak*, at the distance of 14 miles.

Two islands, without names, lie at the distance of 3 miles from this; one to the North, the other to the N.E. *Kuegdogh* lies to the East, 2 miles off from the fifth island. *Kitagotagh* lies to the E.S.E., at the distance of 3 miles from the last-named island. *Ounatchogh*, 2 miles to the N.E. of the preceding; between these two last there is a high and pointed rock.

Cook passed these islands June 20th, 1778, and estimated their distance from the coast at 7 leagues. Opposite to *Ounatchogh Island*, on the coast of Alaska, is a very lofty volcano, the summit of which fell, in 1786, during an eruption. It is, perhaps, the same mountain that Cook saw emitting smoke.

Sannak.—*Sannagh*, or *Halibut Island*, which is the westernmost of those on the coast of Alaska, received its last name from Cook, on account of a great take of that fish. It is separated from the coast by a channel 4 leagues in breadth. "This island is 7 or 8 leagues in circuit, and, except the head, the land of it is low and very barren. There are several small islands near it, all of the same appearance; but there seemed to be a passage between them and the main, 2 or 3 leagues broad."—(Cook.) *Halibut Head* is a round hill in the centre.

* The coal is a lignite of poor quality and not abundant. The seams have been worked, and the produce used on board the Russian-American Company's steamers, but not to any great extent. The place was visited by the United States' Telegraph Expedition in 1865.—*Mr. F. Whymper.*

The **STRAIT of ISANOTSKOY**, separating Aliaska from the Aleutian Islands, was known to exist prior to 1768. It not only separates Alaska from Ounimak, but it divides the latter from *Ikatun Island*, lying $3\frac{1}{2}$ miles South of the S.W. point of Aliaska. The upper or northern part of the strait extends for 12 miles N. $\frac{1}{4}$ W. and S. $\frac{1}{4}$ E.; its breadth does not anywhere exceed 4 miles. At its northern extremity, that is, between Alaska and the N.E. point of Ounimak (behind which lies Krenitzin Bay), the strait is not more than 2 miles broad; and moreover is obstructed by a large number of banks. The N.W. entrance of this strait is extremely difficult, on account of the sand-banks and currents which are felt during the ebb and flood tides. That to the S.E. is very much easier, and the soundings do not give less than $4\frac{1}{2}$ fathoms; but we have no authentic particulars of it.

The lower part of the strait, that is, the portion between Ounimak and Ikatun, or Ikatok Island, is 8 miles long by 4 broad. This breadth, however, is contracted by one half by *Kitenamagan Island*, lying half a mile from Ikatun.

From the North end strait of Isanotskoy, the coast of Aliaska runs to the north-eastward, in nearly the same direction as the southern coast of that peninsula. This will be described presently, in connection with the remainder of the coasts of the Sea of Behring. The Aleutian Archipelago, forming, as it were, a broken continuation of the peninsula, will follow.

ALEUTIAN ARCHIPELAGO.

It is to the celebrated Behring, as we have mentioned regarding the Kodiak Islands, that Russia owes the discovery of the Aleutian Islands. It was during his return from the Coast of America in 1741 that he discovered several of them, now known under the names of Semitsch, Kiska, and Amtschitka. In 1745 an enterprising merchant, named Basoff, made a voyage hither in search of the sea otters. After this period they were more frequently visited, and they daily became better known. The geographical positions of the group we owe principally to the Russian Vice-Admiral Sarytscheff, who accompanied Captain Billings in his expedition in 1791—2. To Captain Cook, too, we owe some observations on this island, and some others near it. Captains Golownin and Kotzebue, in the years 1817 and 1818, determined the position of some of their points. Captain Lütke has given a long article upon this archipelago, from the observations of Lieut. Tébenkoff, M. Ingheström, and several others, which in our general ignorance of this archipelago are valuable. Capt. Beechey has also added slightly to our knowledge of them; and several other navigators, whose names will be alluded to, have added something to the general stock.

The Aleutian Islands form a chain, which extends nearly East and West

from the Isle of Attou, in long. $172^{\circ} 45' E.$, to the peninsula of Aliaska, comprising an extent of 23° of longitude, and between 51° and 55° of N. latitude.

They have been divided into several groups. The western or Blignie group, is composed of four islands—Attou, Agattou, Semitsch, and Bouldyr. Another group is named Kryei or Rat Islands; a third, the Andréanoff Isles; and the eastern group, the Fox Islands, because these animals are only found on the islands composing that particular group.

On all these islands traces of volcanic action are evident. On many of them there are volcanoes in activity, and some, as for example, Ounimak, are subject to continual volcanic eruptions and shocks. The Fox Islands exceed all others in height; the further we advance to the West the lower they become. The direction in which almost all the islands of the Fox group lie, lengthwise, is S.W. to N.E. They are low and narrow to the N.E. But beyond the Island of Amkhitka, where the general direction of the chain runs to the West, this law alters, and the S.E. extremities of the island are lower and narrower, and their N.W. extremities higher and broader.

The following description commences with the easternmost of the Archipelago, and proceeds westward in succession.

FOX ISLANDS.

This group, extending from Ounimak to Amoukta, is the most important of the Archipelago, commercially, on account of the produce of the chase which is annually drawn from them; and, geographically, from their central situation, and the ports they contain.

OUNIMAK is the easternmost of the group, and is separated from the peninsula of Aliaska by the Strait of Isanotskoy. In a harbour in this strait Krenitzin wintered in 1768. In 1826 Captain Beechey passed through the strait separating it from the islands to the southward. He calls its S.W. point *Wedge-shaped Cape*, before which lies a rock, and the narrowest part of the strait is formed by the Isle *Kougulga*, Beechey making the distance $9\frac{1}{2}$ miles.

The southernmost point of Ounimak is called *Cape Hitsou* or *Kithouk*, or *Khitthoukh*; and, from its shape, by Captain Beechey, *Wedge-shaped Cape*. From this southern cape the coast runs to the N.E. to *Cape Lutke*. The S.W. point of the island is *Cape Sarytscheff*; before it is a large rock similarly situated with respect to it as that of the southern cape.

It is about 65 miles long in a N. $52^{\circ} E.$ and S. $52^{\circ} W.$ direction, and its greatest breadth about 25 miles. It is, so to speak, but the cover to a furnace, continually burning; on the summit of this a high mountain chain extends throughout the island, having several spiracles. Notwithstanding the

number of craters, this subterranean fire causes frequent earthquakes. The highest of these summits, the *Chichaldinskoi Volcano*, or *Mt. Shishaldin*, was measured by Captain Lütke as 8,935 English feet high. It is a regular cone; and to the East of it is another, with a double summit. It stands nearly in the centre of this island, in about $54^{\circ} 45'$ and $163^{\circ} 59'$. Mr. Whympers says: "Chichaldinskoi has a very graceful form. Near it is a second mountain of less elevation, with a jagged double summit, of very odd and irregular appearance. Smoke was issuing (September 1865) from a large cleft near the summit." At 6 miles from the S.W. side is another equally conical volcano, called *Pogrommoi*, or *Nosovskoi*, which Kotzebue says is 5,525 English feet in height. The *Issannakh Chain* has also two high peaks towards the N.E. extremity of the island. The whole of the mountain chains are nearer the South than the North side.

A broad bed of gravel forms the N.E. extremity of the island, and a low coast extends as far as the village of Chichaldinskoi without any shelter. The village is two-thirds the distance from the N.E. extremity to a cape $3\frac{1}{2}$ miles East from Cape Mordvinoff. The N.W. extremity, Cape Mordvinoff (*Cape Noisak*), is in lat. $54^{\circ} 51'$, long. $164^{\circ} 29'$. From *Cape Chichkoff*, which is bluff and very remarkable, because the land on each side of it is very low, to the West extremity of the island, Cape Sarytscheff, the coast forms the base of the *Pogrommoi Volcano*. The latter cape is bluff, and of a moderate height.

Rurick or Ounimak Strait, through which Kotzebue passed in 1817, separates Ounimak from the Krenitzin Isles to the southward. Its narrowest part, as before mentioned, is about $9\frac{1}{2}$ miles broad. The currents are very violent in it.

Although Rurick Strait is the widest and safest for traversing the Aleutian chain from North to South, and *vice versâ*, and also the most convenient for passing into the northern part of the Sea of Behring, it is not so advantageous for ships which, coming from the Pacific, are destined for Ounashka. Capt. Wrangel recommends the Strait of Akoutan, farther westward, for this route.

Krenitzin Islands.—The islands next in succession to Ounimak are five in number. The N.E. of them, called *Kougalgâ*, in reality consists of two islands, *Ougamok* and *Ouektok*. There is a peak on the N.E. extreme of Ougamok.

Tigalga, or *Kigalga*, or *Tigalda*, is the next to the S.W., and is about 4 leagues long, East and West. Its centre is in lat. $54^{\circ} 5' N.$, and long. $165^{\circ} W.$ A small island, connected by a chain of rocks to Tigalda, lies off its northern extremity. Tigalda is mountainous, and intersected by three isthmuses. A great quantity of drift-wood is found on its coast, and coal is found on the shore of Derbinskoi Strait.

Derbinskoi Strait separates it from Abatanok, and is remarkable among

all the others for the extraordinary rapidity of the current and its strong tide races.

Abatanok lies West of Tigalda, and is about the same size, and lies in the same direction. At 2 miles West of the western point of Abatanok is the small island of *Aektok*, or *Goly* (bare), which is about a league in circumference, and lies 2 miles South of the South point of Akoun.

Akoun forms the S.W. portion of Rurick Strait, and lies to the West of the Krenitzin Islands. It is about 14 miles long, in a N.E. and S.W. direction; its breadth is unequal. There are two small bays on it, one in the N.E. part, the other in the N.W. part of the island.

The island is mountainous, and particularly cliffy on its N.E. and North sides. On the South side of the island is a sort of column, which, seen from the East or West, resembles a tower, or steeple surrounded by houses. On its N.W. side is a smoking volcano, and near the village on the side of Akounskoi Strait, are some hot springs.

Akounskoi Strait, separating Akoun from Akoutan, is not more than 2 miles wide, is throughout bestrewed with rocks, and subject to strong currents and tide races.

Akoutan lies half a league to the West of Akoun. It is large, mountainous, of a round form, and having a diameter of 12 or 13 miles. It has no good harbour; there are some coves on the northern coast, but they cannot be serviceable to any but very small vessels.

With the exception of Ounalashka, it is higher than the neighbouring islands. Nearly in the centre is an active volcano, measured by Captain Lütke as 3,332 feet. The coasts are steep, particularly on the South side. On the North they slope more gradually and evenly. Volcanic evidences are everywhere abundant, and the fire from the crater was seen in Sept., 1865.

The ISLAND of OUNALASHKA, which is the largest and the best known of the Aleutian Archipelago, follows. It extends 70 miles from N.E. to S.W. The S.W. extreme is in lat. $53^{\circ} 13'$, long. $167^{\circ} 47' W.$; and the N.E. part in lat. $54^{\circ} 1' N.$, long. $166^{\circ} 22' W.$

The name here given as generally known to Europeans is a contraction of *Nagounalaska*. It is the most important of the group, because it was the residence of the chief of the section of the Russian Company's hunting operations.

There are many deep bays on the coasts of Ounalashka, which have nearly all been examined and surveyed by our navigators. The northern shore has the greatest number, as for example:—Captain Bay, the Bay of Otters, Illuluk Bay, Kaleghta Bay, and Samganooda Bay, visited by Cook.

Captain Bay is formed by Capes *Kaleghta* and *Wesilofsky*, which lie in an E.N.E. and W.S.W. direction 9 miles from each other, and is about 13 miles

to its southern part. The upper part of the bay contains three distinct smaller bays, the eastern, northern, and western bays. The southern bay has not much to recommend it; its entrance scarcely more than a quarter of a mile broad.

The eastern bay bears the name of *Port Illuluk*, from the village of that name, where the company had an establishment. Kotzebue says that it would be the best harbour in the universe if the entrance to it was not so difficult; for a vessel entering Port Illuluk, if it should fall calm, would remain exposed to the violent currents and squalls which often occur here. *Oumak-nagh Island* forms the western side of the port, which, like the island itself, has a N.E. and S.W. direction.

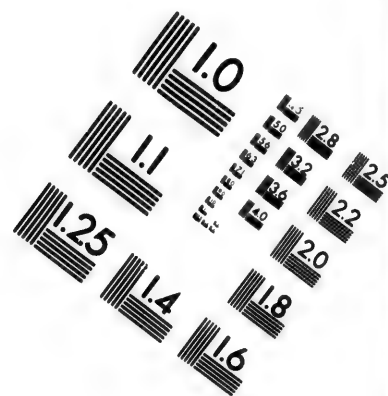
The port is in lat. $53^{\circ} 52' 25''$ N., and long. $166^{\circ} 32' 0''$ W. The establishment of the port, $7^h 30^m$; the highest tide observed, 7 feet 6 inches.

Kalegha Bay, which lies next, to the eastward of Illuluk, is open and deep, and only merits attention on account of a village of the same name at its head. The *Bay of Otters*, or *Hobrovaia*, adjoins Kalegha Bay on the East, and is the largest of those which intersect Ounalashka, being 18 miles deep in a N.E. and S.W. direction. Its breadth, as well at the mouth as the rest of the bay, excepting the North part, is about 4 miles. Both shores of the bay present a large number of small coves, of 2 or 3 miles deep, which contain good anchorages; the rivulets which fall from the mountains afford good water. The western part of the Bay of Otters is formed by a peninsula, which is the same land which forms the eastern side of Captain Bay. At the extremity of this peninsula is Samganooda Bay, where Cook anchored twice.

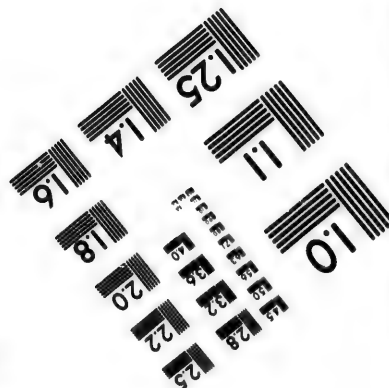
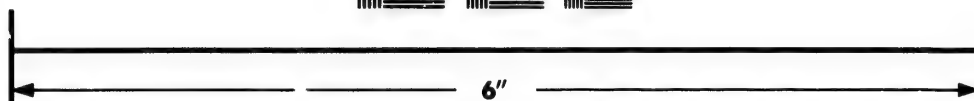
The *Island of Ounalga*, or *Oonella*, lies before Samganooda Bay, mentioned before. Between it and the Island of Akoutan, to the N.E. of it, is the *Strait of Akoutan*. Captain Wrangel recommends this strait to be preferred for passing between the islands, because it leads directly to all the ports lying on the N.E. side of Ounalashka. This strait is $2\frac{1}{2}$ miles broad; but it is somewhat narrowed by a chain of islets, *Egg Islets*, lying half a mile off the N.E. part of Ounalga. *Spirkin Island*, which forms the eastern point of the Bay of Otters, is 10 miles long in a N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W. direction. The *Oudagagh Channel*, which separates it from Ounalashka, is about a mile wide, and $3\frac{1}{2}$ miles long, in a N. by W. $\frac{1}{2}$ W. direction. The depth in it is 45 fathoms. At the N.E. end of Spirkin Island lies the small isle *Ougalgan*, being separated by a clear channel about a mile long.

On the eastern side of Ounalashka is the small bay of *Killiliak*, which is easily known by a remarkable cape, named *Amtschitka*, extending a little to the North of the entrance to the bay. Ounalashka here presents the appearance of being divided into two parts. The bay is perfectly sheltered from all winds.

Makouchinskoy Bay lies about the middle of the island, on the western side.



A resolution test chart featuring various patterns of horizontal and vertical lines of increasing frequency. Each pattern is accompanied by a numerical value indicating its resolution. The values include 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1, 8.0, 9.0, 10, 11.2, 12.5, 14, 16, 18, 20, 22.5, 25, 28, 32, 36, 40, 45, 50, 56, 63, 71, 80, 90, 100, 112, 125, 140, 160, 180, 200, 225, 250, 280, 320, 360, 400, 450, 500, 560, 630, 710, 800, 900, 1000, 1120, 1250, 1400, 1600, 1800, 2000, 2250, 2500, 2800, 3200, 3600, 4000, 4500, 5000, 5600, 6300, 7100, 8000, 9000, 10000, 11200, 12500, 14000, 16000, 18000, 20000, 22500, 25000, 28000, 32000, 36000, 40000, 45000, 50000, 56000, 63000, 71000, 80000, 90000, 100000, 112000, 125000, 140000, 160000, 180000, 200000, 225000, 250000, 280000, 320000, 360000, 400000, 450000, 500000, 560000, 630000, 710000, 800000, 900000, 1000000, 1120000, 1250000, 1400000, 1600000, 1800000, 2000000, 2250000, 2500000, 2800000, 3200000, 3600000, 4000000, 4500000, 5000000, 5600000, 6300000, 7100000, 8000000, 9000000, 10000000, 11200000, 12500000, 14000000, 16000000, 18000000, 20000000, 22500000, 25000000, 28000000, 32000000, 36000000, 40000000, 45000000, 50000000, 56000000, 63000000, 71000000, 80000000, 90000000, 100000000, 112000000, 125000000, 140000000, 160000000, 180000000, 200000000, 225000000, 250000000, 280000000, 320000000, 360000000, 400000000, 450000000, 500000000, 560000000, 630000000, 710000000, 800000000, 900000000, 1000000000, 1120000000, 1250000000, 1400000000, 1600000000, 1800000000, 2000000000, 2250000000, 2500000000, 2800000000, 3200000000, 3600000000, 4000000000, 4500000000, 5000000000, 5600000000, 6300000000, 7100000000, 8000000000, 9000000000, 10000000000, 11200000000, 12500000000, 14000000000, 16000000000, 18000000000, 20000000000, 22500000000, 25000000000, 28000000000, 32000000000, 36000000000, 40000000000, 45000000000, 50000000000, 56000000000, 63000000000, 71000000000, 80000000000, 90000000000, 100000000000, 112000000000, 125000000000, 140000000000, 160000000000, 180000000000, 200000000000, 225000000000, 250000000000, 280000000000, 320000000000, 360000000000, 400000000000, 450000000000, 500000000000, 560000000000, 630000000000, 710000000000, 800000000000, 900000000000, 1000000000000, 1120000000000, 1250000000000, 1400000000000, 1600000000000, 1800000000000, 2000000000000, 2250000000000, 2500000000000, 2800000000000, 3200000000000, 3600000000000, 4000000000000, 4500000000000, 5000000000000, 5600000000000, 6300000000000, 7100000000000, 8000000000000, 9000000000000, 10000000000000, 11200000000000, 12500000000000, 14000000000000, 16000000000000, 18000000000000, 20000000000000, 22500000000000, 25000000000000, 28000000000000, 32000000000000, 36000000000000, 40000000000000, 45000000000000, 50000000000000, 56000000000000, 63000000000000, 71000000000000, 80000000000000, 90000000000000, 100000000000000, 112000000000000, 125000000000000, 140000000000000, 160000000000000, 180000000000000, 200000000000000, 225000000000000, 250000000000000, 280000000000000, 320000000000000, 360000000000000, 400000000000000, 450000000000000, 500000000000000, 560000000000000, 630000000000000, 710000000000000, 800000000000000, 900000000000000, 1000000000000000, 1120000000000000, 1250000000000000, 1400000000000000, 1600000000000000, 1800000000000000, 2000000000000000, 2250000000000000, 2500000000000000, 2800000000000000, 3200000000000000, 3600000000000000, 4000000000000000, 4500000000000000, 5000000000000000, 5600000000000000, 6300000000000000, 7100000000000000, 8000000000000000, 9000000000000000, 10000000000000000, 11200000000000000, 12500000000000000, 14000000000000000, 16000000000000000, 18000000000000000, 20000000000000000, 22500000000000000, 25000000000000000, 28000000000000000, 32000000000000000, 36000000000000000, 40000000000000000, 45000000000000000, 50000000000000000, 56000000000000000, 63000000000000000, 71000000000000000, 80000000000000000, 90000000000000000, 100000000000000000, 112000000000000000, 125000000000000000, 140000000000000000, 160000000000000000, 180000000000000000, 200000000000000000, 225000000000000000, 250000000000000000, 280000000000000000, 320000000000000000, 360000000000000000, 400000000000000000,



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It is $2\frac{3}{4}$ miles wide at its opening, and 11 or 12 miles long in an easterly direction. The head of this bay approaches that of the Bay of Otters within 3 miles, and within 7 miles of Captain Bay, in such a manner that this portion of Ounalashka forms a peninsula of 40 miles in circumference, composed of high mountains, among which a very high volcano is to be distinguished.

OUNNAK ISLAND lies next West to Ounalashka, and, next to that island, is the largest of the archipelago. The strait which separates them is 4 miles wide in its southern part; but this is diminished to one-half by *Tinginak Island*, which lies in mid-channel; this renders the passage difficult for large vessels. Outside the strait, at 5 miles to the South of Tinginak, is a reef, which covers at high water.

Oumna is nearly 20 leagues in length, in a S.W. by S. and N.E. by N. direction. Its height increases in the same direction; and its North end is composed of very high mountains, among which may be distinguished a very high volcano, covered with eternal snow.

Upon the island are two active volcanoes, the first, *Vcevidovskoi*, is nearly in the centre of the island, and is its highest point; the other, *Touliskoi*, is 10 miles from the N.E. side. The S.W. extremity of the island, *Cape Sigak*, lies in lat. $52^{\circ} 50'$, long. $168^{\circ} 42'$. A short distance from this the S.E. coast forms some small open bays, one of which is called the *Old Port*, which is somewhat sheltered from the South from seaward by a bank. Beyond this is the *Black Cape*, projecting considerably into the sea, and forming the open cove called *Drovianaia* (wood), on account of the great quantity of drift-wood thrown on to it. Beyond this the coast runs nearly straight, and not very high, to *Vcevidovskaia Cove*, open to the South, before which lie the *Vcevidovskaia Islands*, mentioned presently. Here the coast is low and sloping, and thus extends to *Gloubokaia* (deep) *Cove*, into which a river discharges itself, abounding with fish. Farther to the N.E., beyond a mass of rocks 90 feet in height, inclining to the N.E., is the village *Egorkovskoi*, in a small creek midway between Cape Sigak and Oumna Strait. The neighbourhood of the village affords great resources. A rude, sandy, and straight coast surrounds this as far as the village *Touliskoi*, lying in front of the islet *Tanghinakh*, in the Strait of Oumna. Near the S.E. coast there are many reefs and banks.

The eastern face of the island facing Ounalashka is steep and rocky in some places, but is not high. The North part is high, sandy, and even, frequently intersected with ravines, but without a single remarkable inlet. The West coast is mountainous, but not steep. On this side at 8 miles from the S.W. extremity, is the largest village of the island, *Retchchnoi*, standing on a small hill between some lakes inland and the sea-shore. Nearly in the middle of the West side of the island is the large but open bay called *Ingakoadak*.

On the S.E. side of the islands and in front of the *Vcevidovskoi* volcano and the bay of the same name, are situated the small islands called, also,

Vcevidovskies. They are six in number, and are 2 miles off the coast, the interval being full of banks.

Oumnak, like the rest of the islands, is deficient of wood, some willow and other bushes only growing on it. It is, next to Oumnak, the most subject to volcanic eruptions. One feature is an evidence of this; it is the abundance of hot springs, one of which resembles the Geysers of Iceland.

To the northward of Oumnak is a long reef, stretching for 26 miles in a nearly North, *true*, direction, at the outer point of which is the *Ship Rock*, so named by Cook, in the form of a tower.

At 200 fathoms within the Ship Rock is the small island of *Joann Bogosloff*. It is of volcanic origin, and did not appear till 1796, after an earthquake. The length of this small island, from N.W. by N. to S.E. by S., is $1\frac{1}{2}$ miles. A chain of rocks projects 2 miles beyond its N.W. extremity, and another a mile from its N.E. point. The peak in the centre of the island is 2,240 ft. high.* This island, as before stated, is connected with Oumnak by a reef of rocks, which doubtless owe their origin to a similar cause; for, in 1778, Cook, and thirty years later Sarytscheff, sailed between the Ship Rock and the Island of Oumnak.

To the westward of Oumnak is a group of four—or, according to Lütke, five—volcanic islands, which bear the name of the *Isles of the Four Mountains*; they are all very near to each other. The name of the S.W. isle is *Ouliaga*; of the N.W. *Tano*; the N.E. is called *Tschiganok*; and that to the S.E. *Chagamil*. The first and the last are the largest, being 5 or 6 leagues in circumference.

H.M.S. *Amphitrite*, Captain Charles Frederick, R.N., passed between the Four Mountains Isles and Younaska on June 28, 1853. The four islands are very remarkable, having conical peaks from 3,000 to 4,000 feet high, and were then covered with snow fully three-fourths of their height. The channel is 10 or 11 miles wide, and apparently free from danger; no soundings at 15 fathoms, a rippling, but not a strong current.

Younaska.—To the S.E. of these islands is Younaska, which is about 5 leagues from N.E. to S.W. There is a high mountain in the centre of the island. *Tschegoula*, or *Tchougoul*, a small island, lies West of Younaska

* Admiral Krusenstern adds the account of this phenomenon, from Mr. Baranoff, chief of the American Company's establishment:—"In 1806, a new volcano appeared on one of the Aleutian Islands. At the end of a month the flame ceased, but the smoke increased considerably, and the island kept on increasing. In 1814 the island was formed by precipices, covered with small stones, which were being continually ejected from the crater. In 1815, a second expedition found the island very much lower than in the previous year, and its appearance entirely changed. The precipices had fallen, and were continually crumbling away."

and near the N.E. point of Amoughta. It is of a circular form, and 3 miles in diameter.

It seems as if formed of fragments of rock ready to fall down, and has no landing place. At about a mile from it, in the direction of Amoughta, is a small isolated rock.

Amoughta, or *Amoukhtou*, is the westernmost of the chain of the Fox Islands. It is nearly round, and about 6 miles in diameter. Its centre is mountainous, and its summit irregular. The coasts are low, but steep. A short distance from its South end, a high column of rock rises above the water.

The Channels between this group are those generally used by ships either going or returning from the Sea of Behring. The Russian Company's vessels generally preferred that of the Strait of Ounimak; but Capt. Wrangel prefers the Strait of Akoutan, between that island and Akoun, as being much shorter. In returning by this strait, with the prevalent S.W. winds, you may run to the S.E. without being cramped by the coasts.

The Strait of Ounalga should not be used except in case of necessity, on account of its narrowness, its strong currents, and its terrible tide races, which, when the wind and waves oppose each other, are sufficient to dismast a vessel.

The Strait of Akoutan is considered by Lütke the best to quit by. It is 2 miles broad between Akoutan and the five *Tchaitchi* (sea-mew) Islands, which are of an oblong form, distant half a mile from the N.E. point of Ounalga. Care should be taken of these islands in coming from the southward, as a mistake might be fatal.

ANDREANOFF ISLANDS.

This group extends from Segouam, or Sigouam, to *Goreli*, or the "Burnt Island," as Lütke also calls the first-named island.

Segouam, or *Goreli*, according to the hunters, is the easternmost of the group. It is intersected by a chain of mountains, divided into three masses, smoke issuing at times from the central mass. In the N.E. part they rise perpendicularly from the water. There are no dangers around it.

The *Amoughta Channel*, to the East of it, is clear, safe, and has similar currents to the rest. The channel to the West, between it and Amlia, is far from being as convenient.

From the extent of the latter island, and also that of Segouam, a barrier of nearly 100 miles is opposed to the periodic current passing between them, and consequently the water rushes violently from either side through the strait, causing terrible and dangerous races.

Captain Henry Trollope, R.N., passed in H.M.S. *Rattlesnake*, between Segouam and Amoukta, August 16, 1853, but without seeing land. He con-

firm this account of the races in the channel. He says, "I never saw such a confused tumbling sea, with appearance of overfalls, &c.; it washed away one of the gangways, and broke on board several times.

Amlia, which succeeds Segouam, to the westward, is long and narrow, and extends nearly East and West, *true*. Its length is about 40 miles. The centre of the island is occupied with a chain of mountains, the greater part of a conical form, but, compared with the others, of a moderate height. There is no active volcano on it, and its shores are in general clear. The West cape projects to N.N.W., and is in about lat. $52^{\circ} 6\frac{1}{2}'$. On the South coast, about a mile from the West end, is a large open bay, and an Aleutian village. At this part the island is not more than a verst (two-thirds of an English mile) in breadth, but it is broader in the middle. The South side forms several bays, but all are open save one, *Svetchnikoff Harbour*; this port is 16 miles from the East extremity of the island, and penetrates $1\frac{1}{2}$ mile to the N.N.W., and is about half a mile broad. It is sheltered from seaward by a small, narrow island, about three-quarters of a mile in length, North and South, half a mile South from the East cape of the port; this space is full of rocks, so that, to enter, this island must be rounded to West. Inside there are 14 fathoms water, and farther inside, 6 to $4\frac{1}{2}$ fathoms, sandy bottom. A high rock, lying South 82° East, at $9\frac{1}{2}$ miles from the entrance, and $2\frac{1}{2}$ miles from the nearest coast, will point out the situation of this harbour.

The strait between Amlia and Atkha is not more than $1\frac{1}{2}$ mile broad, is still further narrowed by some rocks, and cannot be passed by a sailing vessel, on account of the furious currents.

ATKHA, or **Atcha**, is the largest and principal of this group. The length of the island, from the S.W. extremity to the farthest point to the N.E., is more than 50 nautic miles. And here we find the same feature so general in the eastern group of a narrow and low S.W. extremity, enlarging and increasing in height to the N.E. Like the Peninsula of Makouchin, on Ounalashka, the North part of Atkha also forms a peninsula, crowned with high mountains, the northernmost of which is the active and smoking volcano, called *Korovinakoi*, lying on the North coast, and 4,852 English feet in height. Seen from the N.E., it presents two summits, and on the North is very steep, and the shore inaccessible. Four miles to the South rises the volcano of *Klutchevskoi*, and not far from the N.E. extremity is another. The base of the Korovinaskoi volcano advances to the North into the sea, forming a rocky escarpment, which is the North extremity of the island. To the E. of this cape the coast trends to the S.E. On the other side it runs nearly on the parallel without curvature to the N.W. extremity, called *Cape Potaimikoff*, and forms a low, even, flat point, and dropping perpendicularly. It is thus called on account of a reef extending thence 2 miles to the W.N.W. On the cape is a steep, conical volcano. From this the high and cliffy coast

runs to the South, to the low and narrow isthmus of *Sergheieff*. Its West extremity, Cape Korovinskaia, rises out of the sea in a steep cliff, with many slips.

Korovinskaia Bay, which opens to the West, is formed by the large peninsula and the connecting isthmus. Two coves form the harbour of Korovinskaia, which is perfectly sheltered, but has an extremely difficult entrance.

The outer bay is $6\frac{1}{2}$ miles broad in its opening. There is only anchorage on the North side, in 14 fathoms, before the entrance to the harbour. It is without danger in the fine season, but in autumn terrible gales, passing from N.W. to N.E., occur, when a ship could not remain here; and at such times the entrance is covered with breakers for several weeks together.

There is but one village upon Atkha, called *Nikolskoi*, on the South side of the inner harbour of Korovinskaia. It consists of a few houses for the employes of the Russian Company, a church, &c. It is in a low and damp situation, and has many disadvantages. One great inconvenience of Atkha is the extreme scarcity of provisions.

There are two coves on the South side of Korovinskaia Bay. That nearest to the isthmus is only worthy of attention from the fact that fossil wood is found here, which may be an indication of coal. The other cove, *Sarannaia*, is to the S.W. of the former, and is the only place where a ship can anchor conveniently, and also may procure water.

At 6 miles S. $52\frac{1}{4}^{\circ}$ W. from Cape Iaitchnoi, 2 or 3 miles off shore, is the solitary island *Soleny* (salt); it is small, and not high, and between it and the cape is the long *Staritchkoff Reef*. Beyond Cape Iaitchnoi the North coast of Atkha curves to the S.W., and forms several bays, which are open and unimportant. To E. by S. of Soleny Island, and to the South of a cape E. by N. from that island, is the deep bay of *Gloubokaia*, which, it is said, affords excellent shelter.

Cape Tolstoi projects considerably into the sea. On its East side is an open bay; on its West side is *Kourovskaya Bay*, extending first S.E. and then E. by S. It is 24 or 25 miles from Korovinskaia Harbour, and, in fine weather, is serviceable, but in bad or foggy weather its entrance is difficult. And on the S.W. side of Cape Tolstoi is a conical peak, which rises high and isolated near the coast; and between them, at some miles in the offing, the islets which shelter the bay. Steer for the largest of them, and round it carefully by the lead, and, when once it is doubled, the entrance is not difficult. Near the cape lying near the conical peak, called for this reason *Podspotchnoi* (under the peak), is a sunken rock, which only breaks at times. To avoid this, pass between the islands.

Kassatotchy Island, which bears N. 54° W. 9 or 10 miles from the mountain on the S.W. extremity of Atkha, is an extinct volcano. It is a mountain rising at once out of the sea; the crater on its summit is stated to be full of water.

North Pacific.

The **Tchastie Islands**, a group of small but high islands to the West of Atkha, are thus called (*tchastie*, crowded) from their arrangement. There are thirteen of different sizes, and six large isolated rocks. The island nearest to Atkha is *Oglodak*, $3\frac{1}{2}$ miles distant. It is high, steep, and without landing. These islands are said to be unapproachable, from the strong tide-races and currents which rush through them.

Sitkhin Island, which, to distinguish it from another of the name to the West, is sometimes called East Sitkhin, is in lat. $52^{\circ} 4'$ or $5'$, and about long. $176^{\circ} 2'$ (centre). It is about 25 miles in circumference, and in its centre is a volcano covered with perpetual snow, which was ascertained by M. Inghestrom to be 5,033 English feet in elevation.

Adakh is a large mountainous island, but lower than Sitkhin; it is covered with perpetual snow in some parts. Its North end is in about lat. $52^{\circ} 4' 6''$. The bay on the North side is open, and there are others on the N.E., South, and West sides; that to the South offers the best shelter. It is separated by a small isthmus from the bay on the West coast. The position and details of the island are very imperfect, as are also those of the next island.

Kanaga, or *Konniaga*, is the island next West to Adakh, to which it is similar in size, being 7 or 8 leagues in length, by half that breadth. The northern part of this island is remarkable by a high smoking volcano, one of the most lofty in the chain; the rest of the island is not very high. Near to its western part is a small island bearing the name of the Isle of Otters. These islands, however, are but incorrectly delineated and placed on the charts.

Tanaga is separated from Kanaga by a channel 2 leagues broad, extending 8 leagues in a N.E. direction. It is about 11 leagues in extent, from East to West, and 4 in breadth. It is easily distinguished by an elevated volcano, which stands at its S.W. point. Near the point is a bay, which Sarytscheff visited; the entrance may be about 4 miles broad, and is about 8 miles deep. At this distance, in the North part of the bay, the vessel in which he penetrated anchored on a bottom of fine black sand, in front of the entrance of two rivers. Watering is very easily performed in this bay, the boats ascending the rivers without any obstacles.

At 6 leagues to the West of Tanaga is *Goreloy* or *Burnt Island*. It has a very high volcano, whose summit is covered with perpetual snow. It has a circumference of 6 leagues; and M. Inghestrom considers this volcano, and those on Kanaga and Tanaga, as the highest in the Aleutian chain.

South of this is a small group, the chief of which are the two small *Delaroff Islands*, which, with those South of it, form the westernmost of the group of the *Andréanofsky Islands*. They are mentioned by Sarytscheff as being 16 miles S.W. of the S.W. point of Tanaga. He found the passage between quite clear.

At some distance East of the eastern islet are two rocks. At about 15 versts from these rocks, or 40 versts S.S.W. from Goreloy, is a third island, *Kakhvalga*; and 10 or 12 versts to the West of the latter is *Ounalga*, a low island. *Ulak*, also low, and the largest of all, is to the South of Tanaga.

Amatignak and *Illak* are also two small isles to the South of these again. The southernmost, *Amatignak* ("a chip" in Aleute), is the larger of the two, and the highest of all.

KRYCI OR RAT ISLANDS.

The islands next West of the foregoing are included by Lütke and others under the above denomination.

Semisopochnoi.—At 16 or 17 leagues West of Goreloy or Burnt Island is the *Isle of the Seven Mountains*. The name (*Semisopochnoi*) is significant of its character. It is of a circular form, and is 10 leagues in circumference.

According to M. Ingheström, its lat. is $51^{\circ} 59'$, and its long. $180^{\circ} 14' 3''$ West. The mountains do not exceed 3,000 feet in height. One of the mountains in the North part sends forth smoke. The North and East sides have a wild and desolate aspect; on the South and West there are several green spots. The shores are in general clear.

The strait between Semisopochnoi and Goreloy is the best for crossing the Aleutian chain. It is safe throughout, is no less than 45 miles broad, and is not subject to tide races.

Amstchitka is a large island; it is not very hilly, and extends about 11 leagues N. 72° W. and S. 72° E. Near its West point are two small islands, the larger of which is called *Rat Island*, a name, as above mentioned, which has been extended to the whole group. Behring probably saw this island on October 25th, and gave it the name of St. Marcian (*Markiana*). He says it was moderately high, and covered with snow.

The island is about 35 miles in length, E.S.E. $\frac{1}{2}$ E. and W.N.W. $\frac{1}{2}$ W. by compass. It is low, and is not more than 4 miles wide at the S.E. part, but is broader and higher in the N.W. Its S.E. extremity forms a peninsula, on which a hillock rises, and from it a reef extends for 2 miles. The South coast runs nearly in a straight line, without any bays or coves. At about a third the length of the island a chain of moderately high mountains rises, and falls again toward the N.W. extremity, where it forms a low but steep cape, called by the Aleutes *Satanna*, or Bird's Cape.

On the North side of the island, at 10 miles from its East end, is *Kirilovskaia Bay*, the only place in the island where you can stay at anchor. This anchorage is somewhat sheltered from seaward by a reef off its middle, which requires caution in entering; there are also some reefs on either side of it. It is dangerous to remain here in autumn or winter, when northerly

gales are prevalent. The lat. of the bay is $51^{\circ} 27' 1''$, long. $180^{\circ} 40' 6''$ W. High water occurs about 10 o'clock, at full and change.

To the N.W. of Amtschitka are the *Tschegoula Isles*, a group of four small hilly islands, which extend about 6 leagues East and West. One of these is called by Lütke *Little* or *West Sitkhin*, another is named *Dawydoff*.

Kryci, **Rat**, or *Ayougadagh Island*, which gives its name to the group, is 7 miles long, mountainous, and in lat. $51^{\circ} 45'$, long. $180^{\circ} 40'$ W.

Kiska, a hilly island, with the exception of its eastern part, which is low, lies to the West of the preceding. Its length, North and South, is 25 miles. A rock, in the form of a column, lies 3 miles N.W. of the island. Behring saw it October 28th, 1741. He named it *St. Stephan*. According to M. Ingheström, there exists to the East of Kiska, at $1\frac{1}{2}$ mile distant, a small isle, which he calls *Little Kiska*; and three miles from this, in the same direction, the small island *Tannadagh*, and a rock. He also mentions some rocks, which do not uncover, between the islands Bouldyr and Kiska, at the distance of 5 leagues from the former. Capt. Lütke, however, considers this position as doubtful.

Bouldyr lies to the W.N.W. of Kiska. It is a hilly island, surrounded by peaked rocks, which extend to half a league beyond the S.W. point of the island. It is about 4 leagues in circumference, and two large rocks exist at the western part of the island.

BLIJNI GROUP.

This group, composed of two islands and a collection of separate rocks, is called *Blijni* (the nearest), because it is the nearest to Kamtschatka, of the Aleutian chain. The discovery belongs to Behring.

Semitsch forms a portion of this westernmost group of the Aleutian Islands. It consists of two small islands half a league apart, and extending E.N.E. and W.S.W. 6 or 7 miles. On the charts of Sarytscheff and the Russian Admiralty a group of rocks was inserted, as lying 16 leagues to the East of the Isle of Attou. Their distance from the N.E. extremity of the Semitsch Islands is estimated at 5 leagues in a S. 79° E. direction, but their position is very doubtful.

Agattou, to the South of the Semitsch Islands, according to Sarytscheff, has a circumference of 34 miles. It is separated from Attou by a strait of 15 miles wide.

ATTOU is one of the largest of the Aleutian Islands. Its eastern extreme lies 6 leagues W.S.W. from the Semitsch Islands. According to Captain Golownin's observations in 1808, it is $27\frac{3}{4}$ miles in length East and West; but Admiral Sarytscheff makes it 48 miles long. In the S.E. part of the island is a bay called *Massacre Bay*. It is about 3 miles wide, and midway

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between the two outer capes is a group of small islets and rocks, within which there also appears to be a low reef, and another lies outside them, half a mile to the S.W. Lieutenant Etolin discovered on the North coast of Attou an excellent bay, which he called *Tschitschagoff Bay*, where the Russian-American Company had an establishment. It is in lat. $52^{\circ} 56'$, and 9 miles from the eastern point of the island.

This is the western extremity of the Aleutian chain, which forms the south-eastern limit of the Sea of Behring. The two islands lying near the coast of Kamtschatka, Copper, and Behring Islands, 180 miles to the N.W., might almost be considered as a continuation of the chain, but, as they are more connected with the western coast, they are described hereafter in connexion with it.

Attou is the westernmost of the islands ceded by Russia to the United States, being so mentioned in the treaty.

The territorial division passes midway between it and Copper Island, and then in a straight line to the middle of Behring Strait.

BEHRING SEA.

The extensive landlocked sea which bears the name of its great discoverer has been alluded to in the introduction to this chapter. Although very remote from ordinary commerce, its eastern part has been frequently traversed by navigators competent to describe its features. Of these Adms. Beechey, Kellett, Collinson, Captains Moore, Trollope, and others may be cited as having aided in composing the chart. The one great physical feature is the extensive bank of soundings which stretches off for 250 to 350 miles from the American coast, affording an immense anchoring ground for the whaling fleet which frequents its waters. The eastern side, with which we are less acquainted, is apparently deeper, causing a great difference in the mode of whale-fishing; to the eastward, the animal plunging into the mud in shoal water; to the westward diving to great depths.

The whale-fishery has been mentioned in the introductory remarks to this chapter. But, in addition to their primary pursuit, the whalers were all more or less traders, and by their traffic with the natives of the more distant ports and places, so far interfered with the exclusive privileges of the Russian-American Company, that the question was made one of justice to the Russians, that the United States should extinguish this privilege by the payment of a sum of purchase money.

The shallowness of the northern part of the sea, and of Behring Strait, has a marked effect on its physical condition. It will not allow of any floating icebergs drifting southwards from the Arctic Sea; the current generally sets northward, so that its climate, though severe, is not so inclement as a

region in a corresponding latitude on the opposite side of the American continent.

The American side all belongs now to the United States, as before mentioned, being included in the Alaska territory. And our task is rendered somewhat difficult on account of the recent changes of masters, which may induce other changes of which we have received no account.

The **PENINSULA of ALIASKA**,* whose south-eastern coast has been previously described, forms, with the Aleutian Archipelago, the southern limits of Behring Sea, or, as it has been sometimes called, the Sea of Kamtschatka. The description is therefore resumed at the point where the former left off, namely, at the Strait of Isanotzkoy. The charts are imperfect.

Point Krenitain appears to be the first prominent point to the northward. It is the extremity of a low bed of gravel, and is the N.W. point of an open bay, on the East side of which is the village *Morjovskoi* (Morses). This village stands on low, marshy land, intersected with numerous lakes.

Izenbek is the next port in proceeding northward. Its S.W. point, *Cape Glazenap*, or *Mitkoff*, is in lat. $55^{\circ} 14' 8''$, and long. $162^{\circ} 50' 7''$. This cape is very remarkable by a considerable elevation, and by its form; at a distance it is like an island separated from the low land to the South of it. The mouth of the bay is filled up by a long and very low island. Its South point is about a mile distant from Cape Glazenap, and its North point above 2 miles from Cape Moffet. The depth in the South entrance was found to be $4\frac{1}{2}$ and 5 fathoms, bottom of fine black sand. It was considered that Izenbek Bay would offer anchorage.

Imak or *Aamak Island* lies off this part of the coast. It is an extinct volcano, covered with calcined stones and lava. It is rather less than 4 miles in length, in a N. 17° W. and S. 17° E. direction. Its South extremity is in lat. $55^{\circ} 25'$, and long. $163^{\circ} 1' 30''$. At 2 miles N.W. by compass from its North end is a rock called the *Sivoutchy* (or Sea-lions) *Rock*. Between the island and the main the depth is from 9 to 14 fathoms.

The coast to the northward presents nothing very remarkable. It trends first N.E. and then E. For a distance of 50 miles there are only two capes, *Leontovitch* and *Leskoff*, somewhat higher than the rest. In this space there is much drift-wood. Cape Leontovitch is low, but is the most conspicuous, as beyond it the coast trends more to the East.

Cape Rejnoff or *Roshnoff*, which is at the extremity of the extent of coast above alluded to, is very low; and at $1\frac{1}{2}$ mile from it is the western point of *Kritskoi Island*, also very low; the two form the entrance to a shallow bay,

* Captain Lutke says, that in spelling this *Aliaska* he follows the orthography generally adopted in the colonies. It was sometimes previously spelt *Aliaska*. The natives pronounce it *Aliakshha*; so that both modes are right or wrong.

which runs in to a low isthmus, not more than 5 versta in breadth, separating it from Pavlovskaja Bay, on the South coast of Aliaska. The chain of mountains which extends through the peninsula is interrupted in this part. The rise of the tide is 15 feet, and the (approximate) time of high water is 7^h 30^m.

MOLLER BAY is a large indentation of the land, which narrows the peninsula to 12 miles in breadth at this part. A large portion of this bay is filled with shoals, which uncover at low water; but in its S.E. angle is a small cove, where there is sufficient water for every description of vessels. This is the only port which exists on all the North coast of Aliaska. It is about a mile in length and breadth, with from 4½ to 8 fathoms, muddy bottom. In entering it you must range close to the bed of the gravel, to avoid a shoal, which is less than a mile from it; and as soon as you have made out this bed of gravel, steer for a point on the East side of the port, which is particularly remarkable by its blackish colour, and which lies about 1¼ mile N.E. by E. by compass, from the extremity of the gravel bed. The mountains, which are of a moderate height, advance here to the coast, leaving no room for the mossy plains which generally occupy the space between the foot of the mountains and the sea-shore.

The bay is about 6 miles wide in its opening. Its entrance on the West side is formed by the East point of *Kritskoi Island*, which was determined to be in lat. 56° 0' 7", and long. 160° 41' W. The extremity of the bed of gravel which forms the port is 7½ miles to the S.E. by E. (by compass) from this. *Kritskoi Island* is very low, and extends 9 miles along the coast in an E. by N. direction. Opposite its West end is *Cape Rojnoff*, before mentioned.

From Moller Bay the coast trends to the N. by E., and at 20 miles distant, is *Cape Koutousoff*. This cape is high and abrupt, and 13 miles N.E. from it is *Cape Seniavine*, also high and steep, the space between being low. *Cape Seniavine* is in lat. 56° 23' 45", and long. 160° 2' 45" W.

The coast beyond this offers nothing remarkable for a considerable distance. It consists of a low, level, mossy plain. At about 9 leagues from *Cape Seniavine* a low bed of gravel commences, which extends in front of the coast for 10 miles. Beyond this the low level coast extends 10 miles further to *Cape Stroganoff*. This is extremely low, and projects 2 miles to the North.

Comte Heiden Bay (or *Houdobin Bay*) is formed by the low *Cape Stroganoff* to the westward. Before this cape is an islet, equally low, called on the chart *Chestakoff Islet*, and between this islet, or rather between the shoal off its North end and the coast of the continent, is the entrance of the bay, which extends 6 miles to the S.E., and the opening is 2½ miles broad.

From this the coast, equally low, uniform, and covered with moss, trends

to the N.N.E. In lat. $57^{\circ} 5'$ are two moderately high capes, terminating to seaward in sandy downs.

Cape Menchikoff (named after the Prince) is in lat. $57^{\circ} 30'.4$, and long. $157^{\circ} 58'.5$. It consists of a mound of sand, with marshy land surrounding it on all sides. At 8 miles N.E. from this is the mouth of the *River Ougatchik*, or *Soulina*, which is 2 miles broad. The depth in its entrance is from 10 to 18 feet at low water. The North point of its mouth is named *Cape Greig*, after the Admiral. It is high and steep; its lat. is $57^{\circ} 43'$, and long. $157^{\circ} 47'.2$, and is surrounded by sand-banks, dry at low water. From this the coast trends, low, level, and straight, in a general N. 17° E. direction to the mouth of the Agougak River.

The *River Agougak*, or *Ugagouk*, Krusenstern considers to be the northern limit of the Peninsula of Aliaska, as it really separates Aliaska from the continent of America. It rises in a lake called *Nanouantoughat*, which is only separated from the Strait of Chelighoff by a neck of land 5 miles in breadth, at the back of the Bay of Pascalo. Over this space is a portage for the merchandise collected by the Russian-American Fur Company at the establishments in Bristol Bay, which was thus transported, by means of the river, to the head-quarters at Sitka.

Cape Tschitchagoff, on the North side, is bluff without being high, and surrounded for 2 miles distant by shoals.

From this cape a level marshy coast succeeds. Its aspect is most extraordinarily monotonous, for 30 miles in a N.E. by N. direction. *Cape Souvoroff*, which is at the distance above named, forms the North point of the mouth of the *River Nanek* or *Naknek*. This river, flowing from a lake of the same name, traverses the Peninsula of Aliaska. At its mouth it is about two-thirds of a mile in breadth, and there are 2 fathoms water in it. On each side of the mouth are villages. That to the right is *Koutchougoumut*, that to the left *Paougvigumut*. The position of the latter, which is a Russian establishment, named *Souvoroff*, was ascertained to be in $58^{\circ} 42' 5''$ N., and $157^{\circ} 0' 30''$ W. The *River Nanek* abounds with an extraordinary quantity of fish.

BRISTOL BAY.—The coast we have been describing forms the southern portion of the coast of the bay, that was named by Captain Cook after the Admiral, the Earl of Bristol.

Cape Newenham forms the northern point of this bay, and Cape Ounimak, the western point of the island of that name off Aliaska, may be taken as its southern limits, and which lies 82 leagues to the S.S.W. of Cape Newenham, so that the N.W. coast of Aliaska forms the southern part of Bristol Bay.

This bay contains another inner bay, which is formed by a promontory, named *Cape Constantine*, and within which three rivers debouch. The

northernmost of these is the *Bristol River*. The Ouglaghmoutes (as the natives of the bay are called) give it the name of *Quitshak* or *Kvichak*.

The third river which enters this inner bay, to the West of the Bristol River, is called the *Nouchagak* or *Noushagak*. Its course is in a N.N.W. direction. The opening formed on the North by the coast, and by Cape Constantine on the South, may be taken as its mouth, which is 20 miles broad, and preserves this breadth to the distance of 30 miles; it then turns rather more to the eastward, and its breadth begins to diminish. In lat. $58^{\circ} 57'$ the river is still 3 miles broad, and it is here, on the left bank, that the Russian Company founded an establishment, called *Fort Alexandroffsk*. A bank, 15 miles in length, lies before this establishment; and it is between this bank and the main land that there is a passage to the road of Alexandroffsk. The tides are very strong in the river; they rise 23 feet in the summer months, and 47 feet in the autumn. The ebb-tide runs from 4 to 5 miles an hour.

The extremity of Cape Constantine is in lat. $58^{\circ} 29' N.$, and $158^{\circ} 45' W.$ It is surrounded by sand-banks to the distance of 4 leagues to the southward. In general, all the coast between the mouths of the Nouchagak and Bristol Rivers is bounded by similar sand-banks. The eastern point of this bay, forming this entrance, is named *Cape Etoline*. The bay itself is called *Khrantschenko Bay*, after the Russian surveyor.

From Cape Constantine the coast takes a westerly direction, and forms, with Cape Newenham, an extensive bay of 35 leagues in extent, into which the two rivers, *Kululak* and *Tjugiak*, discharge themselves. There are several islands in this bay. Cook only saw the easternmost, which he named *Round Island*. It is an elevated hill, about 7 miles from the continent. At the distance of 20 miles to the West of Round Island is a larger one, about 50 miles in circumference, which has been named *Hagemeister Island*, after the captain of that name, who was for some time commander of the Russian Company's colonies here. Between this point and Round Island there are four other islands in a N.E. direction. Lieut. Khrantschenko passed between these islands, and between the main land and Hagemeister Island. This channel is about 8 miles in length, and it may be passed through either from the North or South; the anchorage in it is safe throughout.

CAPE NEWENHAM is 5 leagues to the West of this bay. It was seen by Captain Cook, July 16th, 1778. It is a rocky point of tolerable height, situated in lat. $58^{\circ} 42'$, long. $197^{\circ} 36'$. Over, or within it, are two elevated hills, rising one behind the other. The innermost, or easternmost, is the highest.

Off the westernmost point of the cape there is a small island, according to the Russian charts, named *Sea Lions' Island*. From Cape Newenham the coast trends to the northward, as before stated, and here commence the sand banks and shoals lying before the mouth of the great river *Kuskowime*,

or *Kouskoquim*, which discharges itself into the sea in lat. $59^{\circ} 50'$, and which was explored by Lieuts. Khrampstchenko and Etoline.

To the N.E. of Cape Newenham is *Tehagvan Bay*, $4\frac{1}{2}$ miles long and 3 broad. It is 2 cables' length in width at the entrance, the sides of which are lined with shoals.

The *Bay of Good News* is 16 miles to the North of *Tehagvan Bay*. It was reached by the land expedition of Oustugoff and Korsakoff in 1818—19. If it received its name from the reports gathered of some white-bearded men on the banks of the *Kvikhpak River*, it would be more properly called the *Bay of False Alarms*. It was examined in 1821 by M. Etoline. From his observations, the extremity of the gravel bed, which bounds the opening of the bay to the North, is in lat. $59^{\circ} 3' 9''$, long. $161^{\circ} 53'$. Cape Newenham bears S. 24° W. 24 miles from it. It penetrates $8\frac{1}{2}$ miles in an E.N.E. direction, and is $5\frac{1}{2}$ miles broad. Its shores are surrounded with shoals, so that there is only good anchorage in the middle, and that not too far in. In entering keep on the North side.

NUNIWACK ISLAND* was discovered by Capt. Wassilieff in 1821. It is to the N.W., and 40 leagues distant from Cape Newenham. It is 70 miles in extent from East to West, and about half that in breadth. Its N.E. extremity is in lat. $60^{\circ} 32' N.$, long. $165^{\circ} 30' W.$; and its S.E. point is $60^{\circ} N.$, and $165^{\circ} 3' W.$ A channel, 20 miles in breadth, separates it from the continent, which here forms a large cape in lat. $60^{\circ} 44' N.$, long. $165^{\circ} W.$, discovered by M. Etoline, to which he gave the name of Cape Vancouver, and that of Cook to the strait.

Its N.E. extremity lies 18 or 19 miles to S. $82^{\circ} W.$, true, from Cape Vancouver. Its West extreme, which forms a moderately high, steep cape, is in lat. $60^{\circ} 13'$. From this the coast on one side trends to E.N.E., and on the other to S.E. by compass. In approaching it from the West, the island presents a level coast, not high, and terminating to seaward in reddish cliffs. There are several places where anchorage may be found; but the best place is in the strait on the continental side, where the depth is 6 to 8 fathoms, gravel bottom.

Cape Avinoff, the S.E. limit of this strait, is in lat. $59^{\circ} 42'$. It is not high, but at a distance resembles an island. It is surrounded by shoals to the distance of 7 or 8 miles, so that it cannot be approached even in a boat within this distance. This bank lines the coast as far as Cape Vancouver itself.

CAPE ROMANZOFF, or **Roumiantsoff**, was thus named after the great

* *Nunivack*, or, as it is otherwise spelt, *Nounivak*, or *Nounivok* (Lutke), was so named by the company's officers, Etoline and Khrantschenko, who, simultaneously with Wassilieff, discovered it in 1821, after the native appellation. The latter called it, from his ship, *Discovery Island*, but the first name is far the best.

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statesman by MM. Khramptschenko and Etoline, although Capt. Schischmareff had already seen it two months previously, that is, in June, 1821. It forms the western extremity of the vast and marshy delta of the Yukon or Kwuh-pak River. M. Etoline determined its lat. as 61° 53'; M. Khramtschenko as 61° 50' 5"; and its long. was deduced as 166° 28'. It is thus about 85 miles N.W. from Cape Vancouver. It is high and bluff, and in the middle of August was still partly covered with snow, which well distinguishes it from the low and sandy shores to the North and South of it. It is entirely free from wood, like the adjacent coasts. Seen from a great distance, it shows like islands.

The **YUKON** or **KWICH-PAK RIVER** is one of the largest of North-West America; yet our knowledge of its existence dates from very recent times. Its character was first made known to Europe by the Expedition in 1850—1, and one of Captain (now Admiral) Collinson's officers, Lieutenant Barnard, was killed at Nulato by the natives, in ascending it. But the officers of the Russian-American Company first ascended it in 1835. Derabin went from Norton Sound to the river in 1839, and in 1842 commenced the Fort at Nulato, which long bore his name. It was visited in the same year by Lieutenant Zagoskin, I.R.N., who made many observations here.

The Yukon or Kwich-pak (pronounced Kwif-pak, both words signifying "big river"), is an immense stream. At Nulato, 600 miles above its mouth, but only 50 miles from the head of Norton Sound, the river is from 1½ to 4 or 5 miles wide, and it has been ascended, still as a large stream, for 1,800 miles. Its tributaries would be large streams in Europe. But all this magnificence of nature seems doomed to be almost useless to man.

At one period it was of the greatest interest to civilization. It was selected by the Western Union Telegraph Company as the route by which the telegraph wires were to connect the New and the Old World; and, as before stated, this gigantic enterprise had far advanced, when in 1867, the success of the Atlantic cable led to its sudden abandonment, an event which caused so much sorrow in those employed on it, that they hung black cloth on the telegraph poles at Unalachleest, in Norton Sound, and put them into mourning.

Mr. Frederick Whympers's admirable work on his travels in Alaska, and on the Yukon, will give many most interesting particulars of this enterprise and of the river.*

The Yukon enters Norton Sound by many mouths, forming an extensive delta. The turbid waters have so filled up the head of the sound, that it is very shallow, and the water is fresh ten miles out to sea.

The various entrances were examined by Mr. E. Everett Smith, attached to the telegraph party, and he found that the southern mouth, the *Koosileac*,

* See also Journal of the Royal Geographical Society, vol. xxxviii, 1868, pp. 210—236.

gave from $2\frac{1}{2}$ to 9 fathoms, but the entrance to it is far out. The intermediate marks to the North are too shallow, and the *Aphoon Mouth*, in lat. $63^{\circ} 10' N.$, long. $164^{\circ} 5'$, is the only available one. These mouths are generally blocked with ice till June 1st. At this mouth is *Pastolik*, a village famous for the manufacture of skin boats.

The coast trends to the N.E. beyond Pastolik, and terminates at Stuart Island, when it turns to the southward towards Fort Michaelovski.

Stuart Island lies in lat. $63^{\circ} 35'$. It is 6 or 7 leagues in circuit. Some parts of it are of a moderate height; but in general it is low, with some rocks lying off the western part. The coast of the continent is for the most part low land, but high land is seen up the country. It forms a point opposite the island, which was named by Cook *Cape Stephens*, and lies in lat. $63^{\circ} 33'$, long. $197^{\circ} 41'$. Some drift-wood was seen upon the shores both of the island and of the continent, but not a tree was perceived growing upon either.

The inhabitants of Norton Sound are entirely dependant on this drift-wood, brought down by the great river Yukon, and which is found on almost every part of its shores.

St. Michael's Island, to the S.E. of Stuart Island, is 50 miles north-eastward from the Aphoon Mouth. It can scarcely be called an island, as it is separated from the main only by an insignificant canal.

Chaktolimout Bay, called by Cook *Chacktoole*, is an open bay to the northward of Michaelouski, between Capes Denbigh and Stephens. It is surrounded by a low shore, where the water is so shoal that, as before mentioned, there is no passage for ships between Besborough Island and the main, though it is 6 or 7 miles off it.

Tebenkoff Cove.—On the North side of Cape Stephens, at 11 miles to the East of the North extremity of Stuart Island, is a cove discovered by Lieut. Tébenkoff, in 1831. It penetrates $1\frac{1}{2}$ miles to the S.S.W., and is closed on the South by a small low island, on each side of which is a strait. The bay is not more than a mile broad. At its West extremity are two islets, very close to the coast. As far as the middle of the bay there are 21 to 24 feet of water. The anchorage under the West side, opposite the village, is only exposed to N.N.W. and N.E.; but even with these winds there is no heavy sea.

FORT MICHAELOVSKI is on the West side, South of the villages. H.M.S. *Herald* came here in September, 1848, and Dr. Seemann thus describes the place. The Fort of St. Michael, or Michaelofskoi, belongs to the Russian-American Fur Company, and supplies two other trading posts, situated some distance in the interior. It stands on a little tongue of land, on the South shore of Norton Sound, in lat. $63^{\circ} 21'$, long. $161^{\circ} 51' W.$, and is built in the form of a square, composed of trunks of trees, which are laid horizontally over each other, in the manner of the American block-houses.

At each angle is a watch-tower, with loopholes; within the walls are the various store and dwelling houses; close by, a chapel, consecrated to the rites of the Greek Church; and at a short distance a windmill for grinding corn. Grain is imported by way of Sitka, St. Michael's itself not producing it, nor indeed any cultivated vegetables, except a few turnips. About four hundred yards from the fort is an Esquimaux village, the inhabitants of which are a much finer-looking race than the more northern tribes. The country adjacent is, like the greater part of the arctic regions, a vast moorland.

Mr. Frederick Whympere came here with the telegraph party in 1865, and he says of it:—"It is situated on the S.E. side of the island of the same name, and was founded in 1833, by Michael Tóbenkoff, an energetic employé of the Russian Fur Company.

"The station is built on the model of a Hudson's Bay Company's Fort, with enclosure of pickets, and with bastions flanking it. Inside are the store-houses and dwellings of the employés, including the 'casine' (*caserne*), or general barrack, bath, and cook-houses. These painted yellow, and surmounted by red roofs, gave it rather a gay appearance.

"The inhabitants of the fort—all servants of the company—were a very mixed crowd, including pure Russians and Finlanders, Yakutz, from Eastern Siberia, Aleuts, from the islands, and creoles from all parts. They were not a very satisfactory body of men; in point of fact, it is said that some of them had been criminals, who had been convicted in St. Petersburg, and offered the alternative of going to prison, or into the service of the Russian-American Company!"

The entrance into the cove is not at all difficult. After reaching Stuart Island you can run parallel with the coast at the distance of a mile in not less than 4 fathoms water; then you can range very close to the two islets on the West side of the cove. Coming from the North you must make either Besborough or Egg Islands; the first lies N. 5° W. from the cove, and the second at 9 miles N.N.E. by compass. *Egg Island* is smaller and lower than Besborough. The latitude of the anchorage is 63° 28' 30", the longitude 161° 52' W.

Unalachleet, or *Unalaklik*, is 48 miles north-eastward of Michaelovski. It is at the mouth of a small river of the same name, and is the most northern settlement on the coast, a Russian trading post founded in 1840. According to Lieutenant Zagoskin, it is in lat. 63° 53' 33" N., long. 160° 30' 16". It resembles St. Michael's in being enclosed by a picket, but is otherwise on a much smaller and poorer scale. The head man had but one room for himself and family. The "casine" was occupied by several men with families, and by an immense number of cockroaches, apparently with families also. To the N.W. of the post was a large village of Malemute and Koriak

Indians, a race of tall and stout people, but in other respects much resembling the Esquimaux.—(Whymper.)

The main stream of the Yucon is not more than 35 miles distant from this part of the coast.

Besborough Island was seen at 15 leagues off by Cook, and though it lies 6 or 7 miles from the continent, has no channel inside it for ships, on account of the shallowness of the water.

Cape Denbigh is 17 leagues from *Besborough Island*, in a direction N. 27° E. It is the extremity of a peninsula, united to the continent by a low neck of land, on each side of which the coast forms a bay, that to the southward being the *Chaktolimout Bay* just mentioned.

The whole of the beach around the bay seemed to be covered with drift-wood; but on account of the shoals, which extend quite around, to the distance of 2 or 3 miles from the shore, it is impossible to get it off.

The head of *Norton Sound* was partially explored by Mr. King, one of Cook's officers. From the heights, on the West side of the inlet, the two coasts were seen to join, and the inlet to terminate in a small river or creek, before which were banks of sand or mud, and everywhere shoal water.

Bald Head forms the north-western limit of this inner sound, and is 20 miles to the northward of **Cape Denbigh**. On the West side of *Bald Head* the shore forms a bay, in the bottom of which is a low beach. At about 20 miles to the W.S.W. of this point the coast projects out into a bluff head, composed of perpendicular strata of a rock of a dark-blue colour. The soundings off this shore are very shoal, not being more than 6 fathoms at a league off, and decreasing to 3 and under to the eastward. The coast continues in a S.W. direction as far as **Cape Darby**, where it turns to the North and West.

Cape Darby is in lat. 64° 21', long. 197°. Captain Cook anchored off it in a quarter less 5 fathoms, half a league from the coast, the South of which bore S. 26° W.; *Bald Head*, N. 60° E. 26 miles distant; and *Besborough Island* S. 52° E. 15 leagues distant. All the drift-wood in these northern parts was fir.

Golovnine Bay.—On the West side of **Cape Darby** is *Golovnine Bay*, discovered in 1821 by Captain *Khrantschenko*. The natives here term it *Tatchik*. Its opening is limited on the East by **Cape Darby**, and on the West by *Cape Kamennoi*, or *Rocky*, lying 7 miles W.N.W. of the first. The latter cape was so called from a flat and bare rock close to it. These two capes are high and steep, but **Cape Darby** is the highest. The bay extends first to North, and then to N.W. At 3 miles to the North of *Cape Kamennoi*, there is a bed of gravel across it, running off to the East from the West side. At 2 miles from the East side of the bay, which is opposite to it, it is terminated by a reef of uncovered rocks, which, at a distance, is ex-

tremely like an artificial pier or mole, whence it is called the *Stone Mole*, or *Kamennaia Pristan*.

There is anchorage in all parts of the outer bay as far as the Stone Mole : bring it to bear from W. to W.S.W. ; within this the depth rapidly decreases. The bay is perfectly clear throughout ; but, as it is open to winds from the South, the anchorage is not without some danger from this cause.

The time of high water, the establishment, is 6^h 23^m. At full moon it rises 3 feet 8 inches.

The inner bay communicates with the outer by a narrow gullet. At its head a large river discharges by five mouths, which makes the water of the bay fresh.

Kalishka or *Garishka*, a fishing station of the Russian Company, is on this coast. Mr. Bourchier, R.N., of H.M.S. *Plover*, travelled from it by sledges to Grantley Harbour in 19 days, March—April, 1851.

Aziak, or *Ayak Island*, called by Cook *Sledge Island*, on account of a sledge being found by him on it, is 10 or 12 miles S.E. $\frac{1}{2}$ E. of Cape Rodney. Its latitude is there given as 64° 30'. Its longitude will be about 166°. M. Tébenkoff thinks it is a mile in circuit. He describes it as a rock rising 642 feet above the water. A low point projects on its North side ; and, on the East, a village stands on the slope of the rugged coast. The island may be approached on all sides. The anchorage is bad to the East ; the bottom is of large stones. It is better to the North, near the point, although the current runs here 3 knots, but the bottom is much better.

Oukivok, or *King Island* of Captain Cook, is a rock 756 feet in height, not more than a mile in circuit, and cliffs on all sides. There is a village, the houses excavated in the rocks, on a rugged slope, at 150 feet above the sea.

POINT RODNEY is a low point to the N.W. $\frac{1}{2}$ W. of Sledge Island. Point Rodney being low, and the water shallow, it is difficult to land. From the beach to the foot of the mountain there is a plain about 2 miles wide, covered with lichens and grass, upon which Captain Beechey observed several herds of reindeer feeding. Upon the beach is a greater abundance of drift-wood than is found on other parts of the coast. About 2 miles from the coast the country becomes mountainous, and far inland rises to peaked hills of great height, covered with perennial snow.

PORT CLARENCE, which was explored and named by Captain Beechey, August, 1827,* is 5 leagues to the northward of Point Rodney. It was passed unnoticed by Cook in his passage through the strait, but this is not surprising, from the character of the land forming it.

* Port Clarence was for a long time previously known to the Russians as *Kaviayak Bay*, but they did not know that it contained its excellent port.—*Lutke*.

Point Spencer, the North extremity of a low spit of land, projecting about 10 miles from the coast, forms the southern protection of this spacious harbour. It here forms a right angle, having a channel about 2 miles wide between its extremity and the northern shore. This southern side of Port Clarence is a low diluvial formation, covered with grass, and intersected by narrow channels and lakes. It projects from a range of cliffs which appear to have been once upon the coast, and sweeping round, terminates in the low shingly point before named, Point Spencer.

Near Point Spencer the beach has been forced up, by some extraordinary pressure, into ridges, of which the outer one, 10 or 12 feet above the sea, is the highest. Upon and about these ridges there was a great quantity of drift timber, but more on the inner side of the point than on the outer.

GRANTLEY HARBOUR forms an inner harbour to the extensive and excellent bay just described. The channel into it from the outer harbour is extremely narrow, the entrance being contracted by two sandy spits; but the water is deep, and in one part there is not less than 12 fathoms. At the upper end of the harbour is a second strait, about 300 yards in width, formed between steep cliffs; but this channel, too, is contracted by sandy points.

"These two ports," says Captain Beechey, "situated so near Behring Strait, may, at some future time, be of great importance to navigation, as they will be found particularly useful by vessels which may not wish to pass the strait in bad weather. The outer harbour, which for convenience and security surpasses any other near Behring Strait with which we are acquainted, I attached the name of Port Clarence, in honour of his most gracious Majesty, then Duke of Clarence. To the inner, which is well adapted to the purposes of repair, and is sufficiently deep to receive a frigate, provided she lands her guns, which can be conveniently done upon the sandy spit at the entrance, I gave the name of Grantley Harbour, in compliment to Lord Grantley."

Point Spencer is in lat. $65^{\circ} 16' 40''$, long. $166^{\circ} 47' 50''$ W. High water, full and change, in the port, $4^h 25^m$.

Point Jackson, named, like the last, from a distinguished naval officer, forms the North side of the entrance to Port Clarence. Off it the water is more shallow than usual.

The harbour has frequently afforded refuge and shelter to our ships since Admiral Beechey surveyed it. The Franklin Search Expedition of 1848—1854, which went via Behring Strait, made it more or less their head quarters. H.M.S. *Enterprise*, Captain Collinson, came here in 1851. The *Plover*, Captain Moore, and afterwards Captain Maguire, was stationed here as a reserve or store ship to the other vessels engaged in the search in 1851—1853. H.M.S. *Rattlesnake*, Commander Trollope, also wintered here Oct.

5th, 1853—June 1854, so that this remote and sequestered spot has received much attention.

Grantley Harbour, after this, sprang suddenly into short lived importance in 1866—7, as it was the spot selected for the landing of the Behring Strait electric cable from the Asiatic shore. During the winter of 1866—7, Captain Libby, of the Western Union Telegraph Service, wintered here, and spent the summer, with 40 men, leaving a good station and other houses when the enterprise was abandoned. It is a central point at which the natives of Kotzebue and Norton Sound, and the neighbouring country, meet the Tchukcheis from the Siberian coast. Many whalers annually visit this harbour for trading purposes, and Mr. Whympere says that it is possible that a permanent white settlement might be formed in this remote place. It is a good spot to winter in, but supplies from the resources of the country are very uncertain.

Cape York, named after the Duke of York, is a bold promontory, and near it there is probably a river, called *Youp-nut* by the natives. From hence to Cape Prince of Wales the coast is of quite a different character to that to the northward of the latter, being bounded by steep, rocky cliffs, and broken by deep valleys, while the other is low, swampy ground.

CAPE PRINCE OF WALES is the westernmost extreme of America. This celebrated promontory is the western termination of a peaked mountain, which, being connected with the main by low ground at a distance, has the appearance of being isolated. The promontory is bold, and remarkable by a number of ragged points and large fragments of rock lying upon the ridge which connects the cape with the peak. About a mile to the northward of the cape some low land begins to project from the foot of the mountain, taking first a northerly, and then a north-easterly direction, to Schischmareff Inlet.

Twelve miles inland the country becomes mountainous, and is remarkable for its sharp ridges. The altitude of one of the peaks, which is nearly the highest in the range, is 2,596 feet. These mountains, being covered with snow, when the *Blossom* was here, (August, 1827), gave the country a very wintry aspect.

Off the cape is a very dangerous shoal, stretching to the N.E. from it. It takes the direction of the current, and is extremely dangerous, in consequence of the water shoaling so suddenly.

BEHRING STRAIT separates America from Asia. A vessel sailing in mid-channel can see both continents at once. Between Cape Prince of Wales and the East Cape of Asia, it is about 37 miles wide, but at its narrowest part are the Diomed Islands. It is, as has been before stated, very shallow, not exceeding from 26 to 30 fathoms in depth, and much of it less than this, so that it will not admit of any deep floating ice bergs to drift southwards. On this account it was considered that a submarine telegraph

North Pacific.

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cable, between Grantley Harbour and Cape Choukotaskoi, on the Siberian shore, would be quite safe from any injury from this cause.

The Arctic Ocean has been, and is, a vast field for the enterprise of the American whale fishers; but as it would unduly swell the bulk of this work to describe it, it is here omitted.

The **DIOMEDE ISLANDS** are three small islands occupying a conspicuous geographical position, as they lie between the nearest points of the two great continents of Asia and America, being thus in the very narrowest portion of Behring Strait.

They have been the subject of some slight dispute as to their real number. Our celebrated Captain Cook places *three* islands here in the middle of the strait. Kotzebue imagined that he saw a *fourth*. The subject was set at rest by Captain Beechey, in the *Blossom*, in 1826. They are *three* in number.

The south-eastern of the three islands is a high square rock, named by Captain Beechey the Fairway Rock, and by the native who drew a chart of this region, Oo-ghe-e-ak. It is an excellent guide to the eastern channel, which is the widest and best. The central island was named, after the Admiral, *Krusenstern Island*, and by the above-mentioned authority, Igna-look. It is an island with perpendicular cliffs and a flat surface. The third, or north-western one, which is the largest, was named by Captain Beechey, after Kotzebue's supposed discovery, *Ratmanoff Island*, and Noo-narbook by the native. It is 3 miles long, high to the southward, and terminates, in the opposite direction, in low, rocky cliffs, with small rocky points off them.

From Cape Prince of Wales the coast trends to the northward, the water being shallow just to the North of it.

The coast itself is low, with a ridge of sand extending along it. The land behind is marshy in the summer, and extends without anything remarkable for 35 miles to the entrance of Schischmareff Inlet.

Having thus described the shores of Alaska, and the adjacent islands in the sea of Behring, it remains to describe the detached islands now belonging to the United States, which are found in it. In this we have derived much information from the voyages of Capts. Lütke, Cook, Billings, Kotzebue, Beechey, and other navigators.

ST. LAWRENCE ISLAND.—This island is the northernmost of those which lie in the open sea. It was discovered by Behring on St. Lawrence's day, August 10th, 1728. He stated that he passed by it without observing anything particular on it except the cottages of some fishermen.

Captain Cook gave it the name of *Clerke Island*. It was seen by Capt. Kotzebue, who examined the East and S.E. sides, but did not observe the union of the East and West portions.

From this cause, beyond doubt, the islands Macarius, St. Stephen, St. Theodore, and St. Abraham of Lieutenant Syndt, are only the higher hills, which are all that are seen of St. Lawrence at a distance. Cook thus named a part of its extreme Anderson Island.

In 1828 Captain Schischmareff made a detailed examination of its shores, with the exception of that part examined by his former commander, Capt. Kotzebue, in 1817. On the S.W. side is a small open bay, where the officers of the *Rurick* landed; this spot is readily recognised by the small rocky island in its vicinity.

From these examinations it appears that the island is above 29 leagues in extent from East to West. The N.W. point, to which Admiral Krusenstern has given the name of the Russian surveyor *Schischmareff Point*, is in lat. $63^{\circ} 46' N.$, long. $188^{\circ} 19' E.$

A very projecting point on the North side of the island is in lat. $63^{\circ} 12' N.$, long. $159^{\circ} 50' W.$ Captain Kotzebue places the eastern point of the island in lat. $63^{\circ} 18'$, long. $168^{\circ} 48'$.

The island which Cook saw near this point, in lat. $63^{\circ} 10'$, long. $159^{\circ} 50'$, is composed, according to Kotzebue, of two islands; Schischmareff says there are three. The inhabitants call the eastern part of the coast *Kaega-lak*, and the western *Chiboko*. The eastern point of the island is named Cape Anderson, and here an historic doubt existed.

A shoal of 11 fathoms was found by the *Blossom* precisely in the situation assigned to a small island named by Cook after his respected surgeon, Mr. Anderson. This island had never been seen after, and the veracity of the great navigator had been in consequence impeached. Captain Beechey, however, rectifies this error, having found that it was intended for the East end of St. Lawrence Island.

We have no detailed description of the shores, or capabilities of the island.

ST. MATTHEW ISLAND.—This island was discovered by Lieut. Syndt, in August, 1766. Captain Cook, ignorant of this circumstance, considered it as a new discovery in 1778, and called it *Gore Island*. He only saw the S.E. part from a distance, and probably only made out the small island lying separately to the North, which the Russian promychlenniks call *Morjovi* or Morse Island. Since Cook's time it has been seen by several Russian navigators. Sarytscheff anchored here; Schischmareff passed close to it. On the Russian charts it has always borne its original name, *Matvoi*, or St. Matthew; but to preserve the name by Cook, Lütke has called the West extremity of the island *Cape Gore*.

St. Matthew Island lies N.W. and S.E., and in a direct line is 27 miles long, and $3\frac{1}{2}$ to $4\frac{1}{2}$ in breadth. Its shores consist partly of high rocks, partly of low land. The S.E. extremity of the island, most justly called by Cook *Cape Upright*, rises out of the water like a wall to the height of 1,400 feet. This is the highest point of the island. It falls suddenly to the N.W., forming a very low and very narrow isthmus; not being seen beyond 4 or 5 miles, causes Cape Upright, even at this distance, to appear as a separate island. Beyond this isthmus, the island increases in breadth and elevation, and then again contracts, forming another isthmus, similar to the first, at 9 miles from it, then a third, from which formation, St. Matthew at a distance appears like several islands. The S.E. or outer point of Cape Upright is in lat. $60^{\circ} 18'$, and long. $172^{\circ} 4'$.

At 12 miles W. 6° N. from this cape is *Sugarloaf Cape*, thus named from an extremely remarkable mountain which surmounts it. This mountain is 1,438 feet in height, and on every side appears as an irregular cone, the only one on the island. Between Cape Sugarloaf and Cape Upright are two bays, entirely unprotected, surrounded by low shores. On the North side of the Sugarloaf is a similar bay, and an isthmus similar to that connecting Cape Upright. From this towards the N.W. as far as the W. extreme, Cape Gore, are almost perpendicular rocks, intersected in many parts by ravines.

Cape Gore terminates to seaward in a low cliff. Off it are some rocky islets. At 9 miles North from the cape, and 3 from the North end of the island, on the coast quite by itself, is a remarkable rock, of a rhomboidal form.

The North point of the island, named by Captain Lütke after Captain Sarytscheff's vessel, is in lat. $60^{\circ} 38'$, and long. $172^{\circ} 41'$. It is steep, but much lower than Cape Upright. The eastern shore of the island much resembles the opposite one. There are corresponding bays on either side, which form the narrow isthmuses.

Morjovi Island is steep on every part except the S.W. Its North extreme, in lat. $60^{\circ} 44'$, and long. $172^{\circ} 52'$, equals Cape Upright, in elevation, and much resembles it. The South end extends in a low point to the S.E.

Pinnacle Island, justly so named by Cook, lies 16 miles W.S.W. from Cape Upright. Two sides, nearly perpendicular, unite at the elevation of 990 feet in a pointed crest, with a number of pointed rocks on it. At the steep S.W. extremity are some isolated rocks; and the N.E. point terminates in an entire range of connected and extraordinary pointed rocks.

The shores of St. Matthew are clear, and the depth very great. There might not be great difficulty in landing in fine weather in the bays. The island is not inhabited, and is scarcely capable of being so. The formation of the island is volcanic.

PRIBUILOFF ISLANDS.

These are a group of three small rocky islands, two of which were discovered by M. Pribuiloff, in 1768; this officer was under Captain Billings' expedition, in 1790. At first they were called *Novy* (new); then *Lebedevski*, from the name of the owner of the vessel which discovered them. M. Chelekov called them *Zouboff*; more recently they have been called *Kotovy* (sea-bears), and *Severnny* (North), from the immense quantity of the animals found there, and their position relative to Ounalashka. Adm. Sarytscheff has placed them on his chart under the name of the officer who discovered them, as here repeated. They are most commonly called in the colonies here *Ostrovki*, the little islands.

ST. GEORGE'S ISLAND is the southernmost. The southern and western parts are surrounded by rocks, but the North is easy of approach, and affords good anchorage in a commodious bay for small vessels, not drawing above 8 or 9 feet water. The whole island is volcanic. It is about 3 miles wide, and extending E. by N. $\frac{1}{2}$ E. 19 miles; or, according to Lütke, $13\frac{1}{2}$ miles in length.

Captain Lütke makes the following remarks on it:—"Its East extremity was determined by us to be in long. $169^{\circ} 10'$. Its lat., according to Captain Tchistiakoff, is $56^{\circ} 38'$. The aspect of the S.E. coast is very monotonous; on its level surface there is but one point rising above the rest, and this is 1,083 feet, English, above the sea. The two extremities of the island terminate in very steep rocks. The North coast, which we examined, consists entirely of rocks, of 300 feet in height, the greater part rising perpendicularly out of the water. In one position, at 5 miles from the N.E. point, the coast slopes inward, and is covered with a thick herbage. Here is the company's establishment. A small cove between the rocks serves to shelter the baidars; you may even anchor there in South and S.E. winds. At a mile off there are 17 fathoms water, black sandy bottom. This anchorage is slightly sheltered from the East by a low point between the village and the East point of the island. The surface of the N.W. part is perfectly flat and horizontal, and is covered with grass. The coasts in general are clear, but at 13 or 15 miles to the East there was a bank seen, in 1824, by Capt. Chramtschenko.

ST. PAUL'S ISLAND, the second discovered by Pribuiloff, is much smaller than that of St. George; this, as well as the former, was the retreat of immense herds of seals.

St. Paul is 44 miles to the N. of St. George, which is 190 miles N. 39° W., true, from the North point of Ounalashka.

Captain Trollope, R.N., says (August, 1863): The channel between St. George and St. Paul is broad, and free from danger, but reefs extend off the S.E. end of St. Paul, and a boiling surf breaks on the long, low, level

island called Morjovi or Morse Island. From the appearance of the water, I should say that no ship ought to approach unnecessarily within 5 miles.

The island extends to the South by a low bed of gravel, on which stands the village. At half a mile to the S.W. is an islet called *Sivoutchi* or *Sea-Lion Island*, in lat. $57^{\circ} 5'$, and long. $169^{\circ} 51'$. Between the bed of gravel and the West end of the island, 7 or 8 miles distant, to the N.W. or N.W. $\frac{1}{4}$ W., the coast curves into a bay, and forms some small coves, in one of which is a tolerably good shelter for small vessels. The eastern and northern parts of the island are low, and the coasts sloping and sandy; but the West side is mountainous, and terminates to seaward on a high steep cape, which is distinguished by a remarkable height surrounding it. There is on the East side of the island another (volcanic) mountain equally remarkable.

At 5 miles W.S.W. from the *Sivoutchi* Rock, and nearly due South (*true*) from the West end, is a small high island, 7 miles in circuit, called *Bobrovi* or *Sea-Otter Island*; a reef extends from this island for half a mile to the S.W., and between this island and St. Paul are some hidden dangers. At 4 miles S. 75° E., by compass, from the East extremity is another low and rocky island, called *Morjovi* or *Morse's Island*. The relative bearing of *Bobrovi* and *Morjovi* is N. 43° E. and S. 43° W. (*true*), and the distance $14\frac{1}{2}$ miles. There are some reefs to the East and North of the island, and also at the West extremity. At 12 miles to the East of its N.E. end is a bank which uncovers at low water; but this is all we know of it.

The vessels which usually come in June and July to St. Paul for the chase, stay on the S.E. side of the bed of gravel spoken of above, in front of the village, at three-quarters of a mile from the coast, in 9 to 13 fathoms water; but there is no security. There is sufficient fresh water in the lakes and rivulets of the two islands. There is no species of wood growing on the islands, and but very little drift-wood on the beaches.

The *climate* of these islands is as humid and disagreeable as possible. Verdure does not show itself until the end of April or May. Dense fogs prevail in summer, the atmosphere is rarely clear, and the sun is still more rarely to be seen. Snow falls in October. In December North winds bring the ice, which remains here frequently until May.

It is sometimes difficult to find these "small islands" in the condensed fogs which prevail here. At times the land may be seen from the masthead, when below it is very thick.

Capt. Beechey, on his first return from his exploration North of Behring Strait, passed these islands; we transcribe his remarks.

He says:—"On the 21st of October, 1826, we came in sight of the Island of St. Paul, the northern island of a small group, which consists of three islands, named St. George, St. Paul, and Sea-Otter. The islands of St. Paul and St. George are both high, with bold shores, and without any

port, though there is said to be anchoring ground off both, and soundings in the offing at moderate depths. At a distance of 25 miles from Sea-Otter Island, in the direction of N. 37° W., *true*, and in lat. 59° 22' N., we had 52 fathoms, hard ground; after this, proceeding southward, the water deepens. St. Paul is distinguished by three small peaks, which, one of them in particular, have the appearance of craters; St. George consists of two hills, united by moderately high ground, and is higher than St. Paul; both were covered with a brown vegetation. Sea-Otter Island is very small, and little better than a rock. The Russians have long had settlements upon both the large islands, subordinate to the establishments at Sitka, and annually send thither for peltry, consisting principally of the skins of amphibious animals.

THE COAST OF ASIA.

The merit of discovery of this coast is due to Behring, as we have repeatedly remarked previously. It had been slightly and cursorily examined by few subsequent to that great navigator's first voyage until Captain Cook saw it, and first declared its true character. Captains Clerke and King passed along it in the following year. Capt. Kotzebue in the *Rurik*, Capts. Billings, Sarytscheff, and Wrangel, also added slightly to our knowledge. But all these authorities collectively gave a very vague and imperfect notion of the whole. All this, however, was obviated by the surveying expedition under Captain (afterwards Rear-Admiral) Lütke, whose excellent and ample work leaves little to desire. This expedition, which left St. Petersburg in August, 1826, consisted of two corvettes, the *Moller*, under Captain Stanikowitch, and the *Séniavine*, under Captain Lütke. The operations of the latter are our present object. After making many excellent observations in the North Pacific, he proceeded to Avatcha Bay, and thence surveyed the greater portion of the coasts of Kamchatka and Eastern Asia to the northward, as far as the East Cape of Behring Strait. The account of this voyage has furnished us with most of the subsequent particulars.

The *Tchuktohis*, the inhabitants of Eastern Asia, may demand a short notice here. Of all the Asiatic races inhabiting Siberia these are the only ones that have not submitted to the tribute of peltries demanded by the Russians.

The *Tchuktohis* inhabit the north-eastern part of Asia, extending from Tchaun Bay to Behring Strait in one direction, and in the other from the Anadyr, and the upper coasts of the Aniui, to the Polar Sea. To the South are the Koriaks, and to the West the *Tchuwanzes* and *Jakahirs* of the Aniui. The *Tchuktohis*, though still in a great measure a nomade race, have less of the characteristics which usually accompany such a mode of life than the wandering *Tunguses*; they are more covetous and more saving

than belongs to the character of the genuine nomade races. They are disgraced by the most shameless licentiousness. Some of them possess large herds of reindeer, which are driven from place to place in search of pasturage, and are also used for riding. At times the meat may be procured in abundance and cheaply.

They have been found to be more friendly than earlier writers have given them credit for, and were serviceable to Captain Moore when he anchored here in 1848-9.

EAST CAPE, the extremity of Asia, has been mentioned before as forming, with Cape Prince of Wales, the westernmost point of America, the narrowest part of Behring Strait. It is a peninsula of considerable height, joined to the continent by a very low, and, to appearance, narrow neck of land. It shows a steep rocky cliff against the sea; and off the extreme point are some rocks like spires. It is in lat. $66^{\circ} 3' N.$, long. $190^{\circ} 16' E.$ From its general appearance it might be taken for an island, and this doubtless occasioned an error in the number of the St. Diomed Islands lying off it.

ST. LAWRENCE BAY lies to the S.W. of East Cape, and was so named by Cook, he having anchored in it on St. Lawrence's day, August 10, 1778. It is remarkable that Behring sailed past it just half a century before, that is, August 10, 1728, on which account the neighbouring island was called St. Lawrence Island.

The bay was minutely surveyed by Captain Lütke in July, 1828, and here commence the sailing directions given by that navigator. *Cape Nouniagmo* is the N.E. extremity of St. Lawrence Bay. It is distinguished by a remarkable hill, not from its elevation but from its rounded summit. *Cape Krleougoun*, which forms the S.W. extremity, is $11\frac{1}{2}$ miles S. $52^{\circ} W.$ from it. The western slope of this mountain declines very gradually to form a large opening, through which runs a rapid but shallow river, on which is a village of Stationary Tchuktehis, named Nouniagmo. It is 2 miles from the cape of the name. *Cape Phaougoun*, beyond which commences the interior bay, is $3\frac{1}{2}$ miles W. by N. from this village. Between these the shores are level and low, terminating abruptly at the sea-shore. From these escarpments, entirely covered with snow in July, avalanches were constantly falling with great noise. Not a single shrub breaks the monotony of the interior plains.

Cape Krleougoun is high and very steep; beyond it the coast turns rapidly to the N.W., towards Mitchigmen's Bay. Upon this cape there is a mountain, very remarkable from some sharp peaks. It is a very well determined position on the chart. The cape is in lat. $65^{\circ} 29' 40'' N.$, and long. $171^{\circ} 0' W.$ At half a mile from its extremity is a large village.

From this cape the coast extends, rounding to the N.N.E. and N., for 7 miles, where a bed of gravel projects, forming a tolerably large lake. It is

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8½ miles S. 58° W. from Cape Pnaougoun, and may be taken as the other point of the inner bay. Above it is a large village.

The depth in the centre of the bay is 27 fathoms. At 1 or 1½ mile from the South shore there are from 7 to 12 fathoms, muddy bottom; on approaching the inner bay the depth increases, and opposite the bed of gravel there are 23 fathoms. No indication of reefs or dangers was perceived.

These gravel deposits will be found to be so frequent in occurrence, that they certainly form a moiety of the entire coast between East Cape and the South extremity of Lopatka. A summary description of them may therefore be here given. What is meant by a *bed of gravel* is a formation or collection of shingle, rising from a few inches to 6 or 7 feet above the surface of the water. They are generally covered with a turfy moss and plants similar to those on the land. They generally extend in a straight line, or gradually and slightly curve. They sometimes form distinct islands, and sometimes join on to the continent, forming the coast itself, or else points projecting from it. Their breadth varies; some are almost washed over by the sea, and none exceed a mile. There is generally a great depth on their edges, and frequently at 10 or 12 yards off there are 4 or 5 fathoms. At 2 or 3 miles off the depth gradually increases, the bottom frequently muddy; so that, wherever one of these gravel beds are met with on the coast, so sure are you to find anchorage. Nevertheless it sometimes occurs that detached and similarly deep banks lie before these. In digging holes in these banks water is found at the level of the sea, but always among the shingle.

Such shingle banks are met with in other regions, but nowhere so frequently as in the seas of Behring and Okhotsk. They are seen at every step, and a glance is sufficient to demonstrate that they are formed by the sea, but in what manner is not so evident.

The inner bay extends W.N.W. and N.W. for 19 miles, and throughout maintains nearly an equal breadth of 3½ miles. Its distance from the South Cape is 2½ miles. Here is the chief entrance; there are more than 27 fathoms water, and no danger. In the East passage there are not more than 11 feet water.

Cape Pnaougoun and the coast, for a mile distant, are formed by a bed of gravel; further off, though low, it is perpendicular, and covered with snow. Extending from Cape Pnaougoun to the N.N.E. and N.W. it forms a cove, 1½ mile long and wide, in which is secure anchorage.

At the extremity of St. Lawrence Bay the termination of a chain of high and peaked mountains abuts, which has every appearance of being a branch of the chain traversing the Tchuktohis country from East to West, and joining the Stanovoi chain.

But few birds or fish, for provision, were seen here; a few salmon were all that were procured. But these privations were amply compensated by the abundance of reindeer which may be procured from the wandering

Tchukktchis, always near the coast in the autumn, for iron articles, &c., or, above all, for tobacco.

Fresh water is to be had, and of very excellent quality, but not everywhere readily procurable. Capt. Lütke took his from a brook 1 mile from Cape Pnaougoun; it may be taken from the beach by means of a hose. On the other hand, not a morsel of wood can be got. It is worthy of remark that, although the opposite or American coast abounds with it, both growing and drift, not a single piece is brought here by the sea. The tides are very insignificant; the greatest difference observed was 15 inches; and were usually very irregular. As near as could be ascertained, the establishment of the port was 4^h 20^m.

The observations made upon the bed of gravel make its West point lat. 65° 37' 30" N., and long. 170° 53' 30" W.; the latter differing half a degree from Kotzebue's position.

METCHIGMENSK BAY.—From Cape Krlougoun the coast turns rapidly in the N.W. part, and, curving in an open bay, extends for 20 miles to the West to a moderately elevated but very steep cape, on which is the large village of *Lugren*. The coast appeared clear, without any danger. A bed of gravel, separating Metchigmenk Bay from the sea, extends from Cape Lugren for 20 miles to the West, curving to the South.

The entrance to the bay is very difficult, from its narrowness and the lowness of the points forming it. Before making them out, the people on them will be seen, as if walking on the water. The entrance is so placed, that its opening cannot be made out until it is brought to bear N.W. by compass, and consequently when near the western side. It must thus be sought from the mast-head, like the opening to a coral reef, which, in foggy weather, is impracticable.

The village of *Metchigm*, on the West side, at 2 miles from the point of the gravel bed, is a sure mark. The winter yourts show themselves by a thick verdure on and around them. The Bay of Metchigmenk penetrates the land for a great distance. The remarks as to supplies at St. Lawrence Bay equally apply to this. The entrance of the bay was assumed to be in lat. 65° 30' 30" N., and long. 172° 0' W. The bed of gravel which forms the West side of the entrance of Metchigmenk Bay extends 5 or 6 miles to the N.W.

At 15 miles from Metchigmenk Bay *Cape Khaluetkin* projects, very remarkable for a round-topped mountain. To the South of the cape is *Héliaghyn Bay* surrounded by a very low coast, apparently terminating in an inner bay.

Thence the coast turns to S.E. to *Cape Nygtehygan*, which, from North and N.E., at 15 miles distant, appears to be an island, on account of the lowness of the land between it and *Héliaghyn Bay*. It is steep; to the N.W. of it a bed of gravel extends 3 or 4 miles, which unites at its other end to the

coast, forming a lake or bay. Beyond Cape Nygtyhygan is the opening of the extensive Strait of Seniavine.

STRAIT of SENIAVINE.—The existence of this remarkable strait was not suspected until the voyage of Captain Lütke, who applied the name of his vessel to it. It is formed by two large islands, *Arakamtchetchen* and *Ittygran*. It runs first towards the S.W., then South, and to the East, nearly 30 miles, and from 6 miles to half a mile in breadth. Its entrance is between *Capes Neegtchan* and *Kougouan*, bearing S. $\frac{1}{2}$ E. and N. $\frac{1}{2}$ W., 5 miles apart. Each of them is distinguished by tolerably high mountains. Neegtchan lies some distance from the coast; but Kougouan falls perpendicularly into the sea, and was distinguished by Cook. Cape Neegtchan, in lat. $64^{\circ} 55' 30''$ N., and long. $172^{\circ} 17' 30''$ W., is the northern limit of the strait; as *Cape Mertens*, in lat. $64^{\circ} 33' 15''$, and long. $172^{\circ} 20'$, is its southern extremity.

At 2 miles from Cape Neegtchan is the small river *Maritch*. Its mouth is a good harbour for small vessels, as they can moor against the land. Near the mouth, to the N.W., is the Tchuktchi village, *Yaniakinon*. *Penkegnei Bay* extends beyond the entrance, first N.W. $\frac{1}{2}$ W. 5 miles, then as far to S.W. $\frac{1}{2}$ S., then 2 miles to West. It is surrounded by high mountains, advancing to the coast itself. It is deep and safe.

Abolecheff Bay.—The continental coast from Penkegnei Bay runs 6 miles to S. and S.W. to Abolecheff Bay, partly steep, partly sloping, but mountainous throughout. Its opening is in front of the South point of Arakamtchetchen Island, and extends 6 miles to the W. and W.S.W. Its breadth is 1 to $1\frac{1}{2}$ mile. Its N. shore consists of a gravel bed, behind which, at a short distance, high mountains rise, among which *Tagleokou* is remarkable for its perfectly conical summit. The upper part of the bay is surrounded by a very low and sandy shore. There is good anchorage throughout above the second cape; but to be perfectly sheltered you must double the third cape, and lie in 17 to 19 fathoms, sticky mud. Fresh water abounds everywhere, but no wood to be obtained.

Abolecheff Bay had a short-lived dignity, which it is very unlikely to regain. It was selected by the officers of the Western Union Telegraph Company as the landing-place for the submarine cable which was to connect the new and the old worlds, from Grantley Harbour on the American side, as related on page 529, *ante*. The enterprise was abandoned.

From the first or S.E. cape of Abolecheff Bay, the coast runs 5 miles to S.W. $\frac{1}{2}$ S., and forms a bay open to the N.N.E. The surrounding mountains will not permit a ray of the sun to penetrate into it; it is therefore cold, sombre, and frozen. From this icy bay the coast runs 3 miles to the East, and approaches the West extremity of Ittygran Island. A bay on the latter corresponds to a gravel bed running to the N.E., and is made re-

markable by the high pyramidal mountain, *Elpyngbyn*; the two together form a sheltered harbour, with 9 to 20 fathoms.

From the mountain *Elpyngbyn* the coast trends evenly to East and E.S.E. for 6 miles; then with steep, reddish cliffs, 2 miles further to Cape Mertens, the South termination of *Séniavine Strait*.

Cape Mertens is high, steep, and is distinguished by a mountain with three summits. Between it and the *Elpyngbyn Mountain* there is no shelter.

Arakamtchetchen Island, the largest of the islands forming the Strait of *Séniavine*, is 16 miles long from S.W. to N.E., and $8\frac{1}{2}$ miles in its greatest breadth. From the S.W. point to nearly one-half its length it is traversed by a chain of hills, moderately high, with flattened summits; the highest of which, *Mount Athos*, has two separate granitic rocks crowning its summit, a short distance apart. *Cape Kyghynin*, the East point of the island, and the easternmost point of the land forming the Strait of *Séniavine*, is in lat. $64^{\circ} 46' N.$, and long. $172^{\circ} 7' W.$, and 28 miles due East of the bottom of *Pen-kegnei Bay*, its western extremity.

Cape Kougouan, the North point of the island, forms, with *Cape Neeg-tchan*, the North entrance of the strait, to which the natives give the name of *Tchiarloun*.

Port Ratmanoff, at 2 miles S.W. from *Cape Kougouan*, is small but good, and is preferable to all others on account of its proximity to the sea. It is easy to make out by *Cape Kougouan* and another cape equally steep but lower, at $3\frac{1}{2}$ miles W.S.W. from it; *Port Ratmanoff* is midway between them. The port is formed by a gravel bed, extending 1,000 yards W.S.W. from the coast it joins. Vessels can moor to the gravel bed, where neither wind nor swell can incommode them.

Cape Paghelian, the S.W. extremity of the island, is 8 miles from this port, the coast between being nearly straight. There is good anchorage in this slight bay formed by it, and tolerable shelter. *Cape Paghelian* is scarcely above the surface of the water. From its commencement the rocky shores run $1\frac{1}{2}$ mile to the East, rising quickly to form the *Meinghyngai Mountain*, conspicuous from its rounded top. Then begins a gravel bed, which, trending in a curve to S.E. and S.W., forms the excellent road of *Glaseenapp*. The extremity of this gravel bed, called *Yerghin*, is $1\frac{1}{2}$ mile to South, $65\frac{1}{2}^{\circ}$ East from *Cape Paghelian*. There is good anchorage in the bay thus formed in from 10 to 16 fathoms mud.

From this cape the gravel bed runs 2 miles to the N.E. to a pointed and steep cape; then the shore gradually trends to *Cape Ryghynin*.

Ittygran Island, 2 miles to the South of the previous island, is 6 miles long East and West, and 2 or 3 miles broad. Its N.W. extremity is distinguished by a blackish and perpendicular rock. From thence the North coast of the island runs directly East, and then turns to S.E., to South, and

S.W., to *Cape Postels*, the S.E. extremity of the island, lying 3 miles N.W. $\frac{1}{4}$ N. from Cape Mertens, and $2\frac{1}{2}$ miles from the nearest part of the continent. This forms the breadth of the South entrance to the Strait of Sényavine, called by the Tchukchis *Tchetchekouium*. *Cape Postels* is distinguished by a moderately high hill, with a perfectly round top. *Kynkai Island*, which is not more than three-quarters of a mile in circuit, lies $1\frac{1}{2}$ mile to S. 62° W. from Cape Paghelian. It is moderately high and rocky. *Nouneangan*, a small rocky islet, is outside the strait, lying $4\frac{1}{2}$ miles N.E. $\frac{1}{4}$ N. from Cape Mertens.

One remarkable feature of the Strait of Sényavine, which also occurs at the Bay of St. Lawrence, is, that in these straits, enclosed by coasts, that the depth is greater than in the middle of the adjacent sea, which does not exceed, except in some parts, 24 fathoms. On the American coast the depth is not great; but it is still more singular that this depth is separated from the shallower open sea by a bank with still less water over it; so that the soundings first decrease on approaching the coast, and then increase when on it. In the middle of Behring Strait the depths diminish equally on either side.

The *tides* were almost imperceptible two or three days after the new moon, but a strong North wind raised the level, temporarily, 2 or 3 feet.

The *wind* naturally affects the atmosphere; with those between North and West it is clear; the South brings clouds, and S.E. moisture.

Cape Tchaplín.—The coast from Cape Mertens runs to the South. The mountains recede into the interior, and from the coast a bed of gravel projects, which, trending in a curve to S.E. and East, forms the long point called Cape Chaplin or Tchaplín, in lat. $64^{\circ} 24' 30''$, and long. $172^{\circ} 14'$ West. At the commencement of this bed of gravel high mountains, with pointed summits, advance to the shore.

CAPE TCHOUKOTSKOI.—Further on the coast trends towards the S.W. and West, and gradually towards the N.W. quarter. Captain Lütke considered the southernmost point of this extent of coast as Cape Tchoukotskoi or Choukotski. It is a bluff headland, declining in a narrow crest, from which rise some high rocks, terminating in points. The cape lies in lat. $64^{\circ} 16'$ N., and long. $173^{\circ} 10'$ W. Beyond this commences the Gulf of Anadyr.

The GULF of ANADYR.—The S.W. limit of this gulf may be placed at Cape St. Thaddeus, lying 200 miles S. 65° W. from Cape Tchoukotskoi. With this breadth in its opening, the gulf is 420 miles in circuit, without reckoning the smaller sinuosities and Holy Cross Bay or the Gulf of St. Croix, which is 180 miles in circuit.

Up to the time of the visit of Captain Lütke, Behring had been the only navigator who had sailed in it. The Gulf of Anadyr (pronounced *Anärder*, and not Annie-dear, Mr. Whymper says) was visited by the Western Union

Telegraph Company in 1865-7. The land round it is low, and in approaching the entrance there is a very curious island, to which the telegraph party gave the name of *Sarcophagus*, from a supposed resemblance. The entrance to the bay is a mile and a half wide at the narrowest point. On the shore large herds of domesticated rein-deer graze.

On the eastern side of the bay Mount Dionysius, a mountain of no great height, is the only land-mark of the district.

Three large rivers enter the bay, two of which are the *Arnoura* and the *Anadyr*. The last is navigable for 300 miles, and has no rapids of importance in that distance. It is subject to violent freshets in the spring, and then rises 15 or 20 feet above its usual level, flooding the country in all directions. (*Travels in Alaska*, &c., pp. 115, 117.)

From Cape Tchoukotskoi the coast extends to N.W. Captain Lütke here went off the land, so that he did not examine the coast immediately to the N.W. of Cape Tchoukotskoi, and this is the part that since his survey has been of great interest, as port Providence was used by the Franklin search expedition in 1848-9, and by the Telegraph expedition of 1865-7. At 12 miles to N. 70° W. from this cape we reach *Cape Stolétié* (of the century), which much resembles the former, of a blackish colour, and having, in a similar manner, isolated rocks on its crest.

At 7½ miles from Cape Stolétié, *Cape Ouliakhpen* projects in a steep declivity, and is high. The rocks of this cape, and also of those further to the N.W., are not so black as those which extend towards Cape Tchoukotskoi; and the isolated and pointed rocks on their crests are not seen here. On the East side of this cape is an open bay, into which the small river *Vouten* falls.

PORT PROVIDENCE or PLOVER BAY is the first opening westward of Tchoukotskoi, and, as stated above, is not marked on Captain Lütke's chart. It afforded winter shelter for H.M.S. *Plover* (Commander Moore) in 1848-9, which was despatched in search of the missing expedition of Sir John Franklin. It is extensive, with safe anchorage, protected from the sea by a long low spit. A supply of water could be conveniently obtained from the anchorage first selected.

Port Providence is always called Plover Bay by the whalers who have frequented it since H.M.S. *Plover* was laid up there in the winter of 1848-9, when on the search for Sir John Franklin. When once in it, it is a very secure haven. It is sheltered at its southern end by a long spit of land, and it is no uncommon thing to find several whaling vessels lying inside in the summer.

Bare cliffs and rugged mountains hem it in on three sides, and many-coloured lichens and mosses are the only vegetation seen, except on a patch of open country near Emma Harbour, where domesticated rein-deer graze. On the spit before mentioned is a village of Tchuktchi natives; their tents are

composed of skin, stretched over a frame built of the large bones of whales and walrus.—(See Lieut. Hooper's Tents of the Tuski.)

Emma Harbour, in which the *Plover* wintered, communicates with the larger one by an opening a mile wide, forming a basin 4 miles long, and $1\frac{1}{2}$ in breadth, surrounded on every side by lofty mountains, except to the southward, where it is separated from the sea by a tract of low land and an extensive lagoon, and having deep water at the entrance and middle, with good anchorage on each side close to the shore. On the low land to the south was a native settlement, to which belonged a large herd of reindeer.

The position of the harbour, ascertained by Commander Moore, R.N., is lat. $64^{\circ} 25' 55''$ N., long. $173^{\circ} 7' 15''$ W.

Plover Bay was selected as the Siberian Station for the Western Union telegraph cable, leaving Grantley Harbour on the American side. A station was built, and the line was commenced toward the Amoor, through a most rugged and difficult country, and one of the party, Mr. Bush, made the entire journey from the Amoor, a distance of at least 2,500 miles, in the winter of 1855—6, a feat which deserved to rank as the most remarkable of many undertaken by members of this expedition.

Cape Uakkoun, like Cape Ouliakhpen, is very high and steep. It is conspicuous, from a pyramidal rock rising from its summit.

Cape Tching-an falls from a great height, almost perpendicularly, into the sea. It is very remarkable by a red band which intersects the cape from its summit to its base.

From Cape Tching-an the coast, consisting chiefly of perpendicular rocks, trends to N.W. and W.N.W. as far as *Cape Spanberg*. It is high, and in lat. $64^{\circ} 42\frac{1}{2}'$ N., long. $174^{\circ} 42'$ W. On the South side of the cape is a high steep rock, with a rounded top, and on the West side is a hill equally rounded, the flanks of which gradually slope on either side. Between this cape and *Cape Halgan*, 9 miles distant, to the N. 71° W., a bay penetrates into the land.

Cape Halgan is high and very steep. In front of it is a large detached rock. *Cape Ninirlioun* is as high and as bluff as the preceding, and in general the intervening coast is equally so. This cape is very remarkable by its flat top, but more so from its entirely different appearance from that which follows it, *Cape Attcheum*, in lat. $64^{\circ} 46'$, long. $175^{\circ} 28'$. This latter cape, moderately elevated, is steep to seaward.

Transfiguration Bay.—A coast extends in a winding manner 4 miles to the N.W. to a small open bay, which Lütke recognised as Behring Bay of Transfiguration or Preobrayenia. It is surrounded by a low shore, and towards its extremity it receives the *River Ledianaya* (frozen), which the Tchuktohis call Kouivaem. From this bay the coast is high, nearly perpendicular, and like a wall; it extends 9 miles to *Cape Enmelian*.

CAPE BEHRING is situated in lat. $65^{\circ} 0' 30''$ N., long. $175^{\circ} 57'$ W. It is particularly noticeable, because here suddenly terminate the steep rocks which, with small exceptions, form the entire extent of coast as far as Cape Tchoukotskoi, and further North the coast becomes still lower. The mountains in this space are similar to those at Cape Tchoukotskoi; of a moderate height, level at the summit, sloping, and even flat, which particularly characterises the mountains about Cape Ninirlioun. The high and peaked mountains, like those in the Bay of St. Lawrence, will no longer be seen, even in the distance. From Cape Behring the coast turns abruptly to the N.E., then to North, sloping gradually, and terminating perpendicularly in some parts, as far as *Cape Tchirikoff*, which is steep, and forms an open bay.

Beyond this only a single bluff and high cape can be distinguished, lying 4 or 5 miles to the N.W. of Cape Tchirikoff. The coast thence trends towards the mouth of a large river, from whence it takes a westerly direction. All the eastern shore of the Gulf of Anadyr is destitute of wood.

To the West of the river above mentioned, the coast is low for 4 miles, and then commences to become hilly. The mountains, higher than those on the East coast, are peaked or flat at the summit, but are all dispersed without any order. The coast in this form extends 15 miles W.N.W. $\frac{1}{2}$ W. and W.N.W., forming a small open bay, into which a small river falls, and terminated on the South by a high bluff cape. The bottom of the bay is in lat. $64^{\circ} 36\frac{1}{2}'$, long. $176^{\circ} 48'$, and is properly the northern extremity of the Gulf of Anadyr.

At 4 or 5 miles from this last bay the most remarkable bed of gravel that had been seen commences. It extends without interruption to S.W. and W. for 45 nautic miles, as far as Cape Meetchken, in the Gulf of St. Croix, and consequently forming the largest portion of the North coast of the Gulf of Anadyr. It is throughout nothing but a heap of bare shingle, with the exception of a very few spots, where there had been, or still was, a habitation. A narrow and shallow canal separates this gravel bed from the continental coast, which runs parallel to it, and bounds the sea with low reddish cliffs.

HOLY CROSS BAY, or *The Gulf of St. Croix*, occupies a space of 54 miles of latitude, and 35 miles from E. to W. It reaches within 10 miles of the arctic circle. Its shores, to the distance of 35 miles from its entrance, run nearly parallel to each other, to N.N.W., and 20 miles apart. Further on they approach each other, and narrow the gulf to less than 4 miles.

Cape Meetchken, the western extremity of the bed of gravel previously described, forms the East point of the entrance; it is in lat. $65^{\circ} 28' 40''$, and long. $178^{\circ} 47'$. The shortest distance to the opposite shore to the West is $13\frac{1}{2}$ miles.

There is good anchorage on the North side of Cape Meetchken, open how-

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ever to N.W. and W.N.W.; the coast in this direction, being 40 miles distant, affords not much protection. The depth is 5 to 9 fathoms, and the best place is to bring Cape Meetchken to bear S.W. by compass. Care must be taken, in entering, of the rocky bank, which lies $1\frac{1}{2}$ miles S.W. of the cape.

The eastern side of the gulf, the nearest part of which is 8 miles from Cape Meetchken, has but very little depth. There are no mountains whatever along the coast. Only near the entrance a branch of the mountains advances, of which the nearest to the gulf is called, by the Tehukchis, *Linglingai*, meaning "heart rock," in Russian *Serdze Kamen*. It lies in lat. 65° 36 $\frac{1}{2}$ ' N., long. 178° 17', and its height is 1,462 feet above the level of the sea. It is one of the best determined points in the gulf.

At 26 miles from Cape Meetchken a tolerably large and high bed of gravel advances from the coast to the N.W., and forms a cove 2 miles in circuit, exposed to the N.W., in which there is safer anchorage than in that at Cape Meetchken.

At about 8 miles from this point a long and low point projects, forming the South limit of the *Bay of Kanghynin*, which is nearly 6 miles wide at its opening, but is shallow.

Egvekinot Bay, at the head of the bay, penetrates 7 miles due North, with a breadth of 1 or $1\frac{1}{2}$ miles. The high mountains which surround it leave all round a narrow band of low shore. There is no part of the bay worthy of the name of a harbour. *Etelkouium Bay* lies by the side of the former. The depth in the entrance was 13 to 18 fathoms, muddy bottom. It had every appearance of being a good port. At the entrance of the bay, on its North side, a bed of gravel forms *Krusenstern Cove*. Quiet anchorage may be had within it.

Ten miles to the West of Etelkouium Bay is *Engaoughin Bay*, on the N.W. angle of Holy Cross Bay. It is a round cove of 9 miles in circuit, sheltered from the South by a low point projecting 2 miles to the West, and by a gravel bed standing alone in front of the point. This forms an excellent harbour, the only one worthy of the character in the Gulf of St. Croix.

From this bay the western coast of the gulf runs S.S.W., and then curves gradually to the S.E., without forming a single remarkable bay or cove. At the distance of 10 miles from the port the mountains advance very near to the sea, and reach it in places with high cliffs. The most remarkable mountain about it is that of *Matatchingai*, at the bottom of Etelkouium Bay. It is distinguished from all others as well by its elevation as by its sombre and rugged flanks. Its height was calculated at 9,180 feet.

On the West side, up as far as the Port of Engaoughin, a large quantity of drift-wood is found, even long and large trunks of trees; on the East and North coasts, on the contrary, not a single piece is met with. This circumstance is worthy of note; it proves that the current from the River Anadyr,

North Pacific.

from which it comes in entering the Gulf of St. Croix, bears chiefly to the West, although from the bearing of its shores the contrary would have been anticipated. On no part of the shores of the gulf is the smallest trace of growing wood to be met with.

The establishment of the port appears to be $8^h 50^m$. The greatest rise was 7 feet, but usually it was $4\frac{1}{2}$ to $5\frac{1}{2}$ feet; some former traces showed a rise of 9 feet.

The **RIVER ANADYR**, which gives its name to the gulf which receives its waters, is the most considerable which falls into the Sea of Behring. The Western Union Telegraph was intended to follow the course of the river up to some villages called *Anadyrsk*, some distance from its mouth. From this it was to cross over to the head of the Sea of Okhotsk at Tigil, thence proceeding to Ghijega.

The telegraph party who wintered on the Anadyr in 1867, found that blinding snow storms were prevalent during winter, and between log-houses, no more than one hundred yards apart, it had been found necessary to stretch a guiding rope for the men. Reindeer meat was obtained in great quantities.

CAPE ST. THADDEUS is the S.W. cape of the Gulf of Anadyr. Behring perhaps gave this name to a cape on August 21, o.s., being in lat. $62^{\circ} 42'$, and from his data the term has been defined to apply to the high bluff cape situated in lat. $62^{\circ} 42'$, long. $179^{\circ} 38' E$.

Cape St. Thaddeus is the point which projects farthest to the East in this portion of the coast, while beyond the cape turns to the N.W. and S.W., so that it forms a sort of natural limit to the Gulf of Anadyr. At 15 miles to the S.W. $\frac{1}{4}$ S. is another high cape, to which Captain Lütke applied the name of *King*.

Archangel Gabriel Bay.—From Cape King the coast turns suddenly to the N.W., forming a bay, which penetrates the land to a depth not less than 15 miles, with a breadth of 6 miles. To this bay Captain Lütke gave the name of Behring Vessel.

CAPE NAVARIN.—From Archangel Gabriel Bay the coast runs South to this cape, in lat. $62^{\circ} 16'$, long. $179^{\circ} 4\frac{1}{2}' E$. In addition to this conspicuous situation, Cape Navarin is remarkable for a high mountain on its point, 2,512 feet in height, the flanks of which descend nearly perpendicularly into the sea.

Cape Navarin is the South extremity of the peninsula which bounds the Archangel Gabriel Bay on the South. A chain of high mountains extends through it. *Mount Heiden* surpasses the rest in elevation (2,230 feet), and is distinguished by its conical form. In the middle of September (1827) it was entirely covered with snow.

From the cape we have a long interval of coast, upwards of 350 miles in extent, of which we know nothing. Captain Clerke passed it at a

great distance, and Captain Lütke, both in his progress to the North and on his return, was prevented by bad and foggy weather from making observations on it.

CAPE OLUTORSKOI is the first point described by Captain Lütke. It is in lat. $59^{\circ} 58'$, long. $170^{\circ} 28'$ E. It is remarkable by a high mountain with three summits (2,337 feet) with a steep ascent from the sea. From this cape the coast extends on one side to W.N.W., towards the *Gulf of Olutorskoi*; and on the other, first 4 miles to E.N.E., then 30 miles to the North rather inclining to the East. In all this extent it is mountainous, and falls into the sea in cliffy headlands.

The Gulf of Olutorskoi was not examined by Captain Lütke on account of the fog and its distance. Its western termination is a cape, which was supposed to be *Cape Govenskoi*, in about lat. $59^{\circ} 50'$, long. $166^{\circ} 18'$. It is high, bluff, and cliffy, and over it are some high mountains.

Cape Ilpinskoi.—From this cape the last-named coast trends nearly West to Cape Ilpinskoi, where the coast suddenly becomes lower. This cape is in lat. $69^{\circ} 48\frac{1}{2}'$, long. $165^{\circ} 57'$. Projecting from mountains of a moderate height, it advances to the S.W. in an even point, not very high, and falling perpendicularly into the sea. According to Krachenninikoff, it is joined to the continent by an isthmus so low and narrow that the sea washes over it.

Verkhotoursky or *Little Karaghinsky Island* lies directly before Cape Ilpinskoi. Its lat. is $59^{\circ} 37\frac{1}{2}'$, long. $165^{\circ} 43'$. It is of a round form, and 3 or 4 miles in circumference. On all sides except the N.W. it falls perpendicularly into the sea.

The strait between Verkhotoursky Island and Cape Ilpinskoi is 12 miles broad. Nearly in the middle of it is a dangerous reef, awash, extending $1\frac{1}{2}$ or 2 miles East and West. In the centre is a small but high rock.

From Cape Ilpinskoi the coast curves to the West and S.W., forming a large gulf, which is bounded to the South by the large Island of Karaghinsky.

As this bay forms one of the narrowest and the lowest portion of the peninsula of Kamtschatka, it is usually taken as the northern limit of that country. The Bay of Penjinsk, in the Sea of Okhotsk, forming the opposite coast.

Although a small portion of the coast to the southward may be included in the shores of the Sea of Behring, we shall for the present quit them, leaving them to be described in connection with the peninsula in the next Chapter.

COMMANDER ISLANDS.

These two islands, Behring and Medny or Copper Islands, which still belong to Russia, do not in reality form a portion of the Aleutian Archipelago, but must be considered as a part of the chain connecting the volcanoes of America with those of Kamptchatka.

The first Russian navigators gave them their present name of the *Komandorski Islands*, in memory of one of the most tragic events in the annals of navigation—the death of Behring (known in these countries under his title of Commander), on the westernmost island, which now bears his name.

Captain Lutke's Voyage of the *Seniavine* has furnished us with the accounts of them.

BEHRING ISLAND is nearly 50 miles long from N.W. to S.E. Its greatest breadth at the North end is 16 or 17 miles; to the S.E. it narrows, and forms a pointed cape, in lat. $54^{\circ} 41' 5''$, long. $166^{\circ} 17'$. A chain of mountains, of 2,200 feet in height, extend throughout the island; in its centre are some peaks. They are in general higher in the South, and lower and more even in the North. The South cape, called *Cape Manati* by Behring's companions, is conspicuous by some high peaked rocks terminating it. From this the East coast trends North in steep cliffs to *Cape Khitroff*, in lat. $54^{\circ} 56'$, long. $166^{\circ} 43'$ E. From this to the N.E. point, *Cape Waxell*, the coast trends generally N.W. $\frac{1}{4}$ N. and S.E. $\frac{1}{4}$ S. The N.E. extreme is an obtuse, low head, projecting 3 miles into the sea. Reefs project from its North and East angles to a mile or more.

Cape Youchin, the low N.W. extremity of the island, is in lat. $55^{\circ} 25'$, long. $165^{\circ} 58'$ E. From this point a dangerous covered reef extends 2 miles to the North, on which, at 4 cables' length from the shore, is a large uncovered rock. Between Capes Waxell and Youchin the coast forms an open bay, and about midway between them was a temporary establishment of the Russian American Company. These men say the whole of the bay is bestrewed with rocks.

From Cape Youchin the coast trends to S.W. to the West extremity of the island, in lat. $55^{\circ} 17'$, long. $194^{\circ} 10' 3''$, according to Admiral Beechey; and thence to the S.E., in which direction, at 10 miles further on, is the company's factory, on the shore of a small bay open to N.W. This bay is called here the *port*: but it must be by contrast to the other unapproachable points. Two islets abreast of the village, due West by compass, are good marks to make the port; the one, *Toporkoff*, is 2 miles, and the other, the *Arii Rock* (the Alens Rock), at nearly 6 miles. Between the two, rather nearest to Toporkoff, is a sunken rock, that only uncovers at low water, called *Polovintchaty*.

The spot where Behring died, as related in a former page, is on the East side of the island, at three-quarters of a mile W.N.W. from Cape Khitroff.

The water is very deep around the island. At from 4 to 6 miles off the N.E. and North shores the depth was found to be 53 to 67 fathoms, muddy bottom on the North side; further to the East, stony bottom.

MEDNY or COPPER ISLAND is remarkable for its long and narrow figure. The only island it resembles hereabout is Amlia. It is about 30 miles in length, and its greatest breadth towards the middle is not more than 5 miles; it frequently does not exceed 2 miles. It seems to be the crest of a mountain rising out of the sea in a S.E. and N.W. direction. Medny Island is scarcely lower than its neighbour, Behring Island; seen from the *Behring Cross*, as the spot where the commander perished is termed, it appears to consist of three islands. Its shores are very steep, clear in most parts, and the depth around very great. There are some reefs at its N.W. and S.W. extremities, and at some other points, but they do not extend far off. The island is entirely without anchorage for large ships; but on its N.E. side, at 10 miles from its N.W. extreme, is a small port, where small vessels may ride.

The company's establishment is on the South side of the harbour. Its lat. is $54^{\circ} 47'$. The lat. of the N.W. extremity is $54^{\circ} 52' 25''$, lon. $165^{\circ} 31' E$.

Medny (Mednoi or Copper, as the Russian name signifies) was thus named on account of the native copper found here, and which was attempted to be worked in the middle of the last century, but the poverty of the mine led to its abandonment.

The *climate* of these islands is not very rigorous. There are no very intense frosts in winter, but they have at times very heavy snow storms. In January and February the N.W. and West winds bring the ice on the coasts in large quantities. The weather is clear with N.E. and East winds; it is overcast with those from East and S.E. There are no active volcanoes on either of the islands, but earthquakes are frequent, the shocks of which are sometimes felt for a long time.

After violent and long-continued winters, a large quantity of drift-wood is thrown on to the shores, principally of those species that grow at Kamtschatka, but sometimes the cypress that grows on the American coast, and even the wood which only grows at Japan. Sometimes, also, lacquered vessels of wood, of Japanese manufacture have been found, which goes to prove that in this part of the ocean the currents trend to North or N.E.

CHAPTER X.

KAMTCHATKA, OKHOTSK, AND THE KURILE
ARCHIPELAGO.

THE first country described in this Chapter is the great peninsula of Kamtschatka. It lies between the parallels of 62° and $51'$ North latitude, and is consequently about 800 miles in length. The honour of the first discovery of Kamtschatka is attributed to Feodor Alexeieff, a merchant, about the year 1648. The conquest of the peninsula was completed in 1706, and it has ever since paid tribute, in furs, to the governor of Irkutsk. It was made a new province by Imperial ukase of December 14th, 1849, and formed of the territory under the administration of the sea coasts of Kamtschatka, and the district of Ghijinsk.

The natural limit of the peninsula would seem to be, as we have before stated, at the bay to the West of Cape Ipinsk. The civil division extends beyond this to the River Olioutor.

The natives are of two races, the Kamtschadales and the Kariaks or Koriaks, whose territories are divided at Cape Oukinskoi. The Kamtschadales differ from them more in mode of life than physical conformation. They seem to partake of the Mongolian type.

Of the geography of the peninsula a few words may be said. Of the eastern coast, with the exception of the few points imperfectly seen or observed by Cook and other navigators, the only delineation that existed for a long period was that furnished by Behring. Captain Lütke was despatched from St. Petersburg to minutely survey this coast in the *Seniavine*, in 1827--28. Delays and contrarieties prevented this being done to the extent intended, and only some of the more prominent features received the great attention which that commander was capable of exercising in this exploration. That officer's work was published in 1835--36. Professor Adolph Erman also employed some time in the examination of various points on land. It has since then been examined by Russian officers, and their chart was published in 1849--51.

Kamtchatka is pre-eminently a country of volcanoes. Some of the highest peaks in the world surmount its mountain ranges. These mountains, which cover about two-thirds of the entire surface, form an irregular chain in a S.S.W. direction. Many of their summits are in a high state of volcanic action; and, considered as a whole, it may be supposed that they form a portion of the great volcanic belt which extends through Aliaska and the Aleutian Islands, and is continued on through the Kuriles, Japan, and Formosa, to the Asiatic Archipelago.

In the principal range running North from Cape Lopatka, its South extremity, thirteen summits, with craters and hot springs, have been observed, one other height being isolated, and lying West of the main range. The most active of these are Assatchinskoi (8,340 feet), Avatcha (8,760 feet), and Klutchevskoi (16,512 feet). During an eruption of the first, in 1828, the scoria and ashes were carried as far as Petropaulovski, 120 versts (80 English miles) distant.

There are no large rivers in Kamtchatka. The configuration and formation of the peninsula preclude this. The largest is the Kamtchatka River, which, however, is said to be capable of admitting vessels of 100 tons about 150 miles up the stream.

The severity of the climate has been exaggerated, though it is severe. In some of the sheltered valleys, which possess great natural beauty, the temperature is not very inclement. Perhaps a similar train of remarks would hold good both for Japan and Kamtchatka, that there is great difference between the East and West faces of the country; the former differing from the piercing West winds passing over the ice and snow of the continent of Asia. Of course agriculture has been but little pursued. Its slender population know but few wants, and these are supplied from the produce of the chase, as bears, lynxes, otters, reindeer, foxes, &c. The skins of these form the principal export, and but few supplies can be calculated on by vessels touching here.

KARAGHINSKY ISLAND.—This island, and the adjacent coast, until the time of Lutke's exploration in 1828, had not been seen by any known navigator, except Syndt, since the time that Behring had seen one or two of its points through the fog.

It is 55 miles in length, and an uninterrupted chain of mountains traverses its length, declining towards the S.W., and rising again at the South end, forming a mountain about 700 feet in elevation. The western coast is of an insignificant height. All the shore of the North and East sides of the island is higher and steeper. This causes a great difference in the appearance of the opposite coast, the steep ascents, the rugged or rounded summits, frequently rising to 1,250 feet above the sea, and an Alpine vegetation, give it a mountainous character.

Its N.E. extremity, *Cape Golenichtcheff*, in lat. $59^{\circ} 13\frac{1}{2}'$, long. $164^{\circ} 40' E.$.

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is 25 miles nearly direct South from the Island of Verkhotoursky. Its South end, *Cape Krachenninikoff*, in lat. $58^{\circ} 28'$, long. $163^{\circ} 32'$, is at the distance of 40 miles from Cape Oukinskoi, on the coast of Kamtchatka. From the N.E. extremity to the S.E., in the centre of the island, a chain of steep mountains extends, of 2,000 feet in height, on the two flanks of which are chains of less elevation.

At 13 or 14 miles from the S.W. end of the island, the mountains decline considerably in height, becoming more even and sloping, and at 6 miles from this extremity give place to a low isthmus of $1\frac{1}{2}$ mile broad, which, beyond 20 miles off, gives the appearance of a separation of the higher hills to the southward.

Beyond the S.W. end the coast trending to the East forms a bay open to N.N.E. and N. by W., but where there is very convenient anchorage.

At 31 miles from the S.W. end, and at 27 miles from Cape Golenichtcheff, a bed of gravel running off the coast extends 7 miles to the West and S.W. Its point, *Cape Sémenoff*, is $13\frac{1}{2}$ miles S. 62° E. from Cape Kouzmichtcheff on Kamtchatka. It is low, and is from half a mile to 300 yards in breadth. With the coast it forms a bay, open to all the S.W. quarter; but notwithstanding this, it is an excellent roadstead.

The depth in the strait separating Karaghinsky from the continent is from 15 to 27 fathoms, most commonly a muddy bottom. It seemed as if there was some bank at 4 or 5 miles to the S.E. of Cape Krachenninikoff, as a change in the colour of the water was observed, and the soundings rapidly decreased to 12 fathoms.

Cape Ipinskoi, which has been before alluded to, is the North point of the large gulf which washes the eastern shores of the narrowest part of the Kamtchatka Peninsula. It is in lat. $59^{\circ} 48\frac{1}{2}'$, and long. $165^{\circ} 7'$. It is joined to the continent by a low and narrow isthmus, over which the sea washes.

Cape Kouzmichtcheff, the position of which is well determined as lat. $59^{\circ} 5'$, and long. $163^{\circ} 19'$, is steep, and is conspicuous by the direction of the coast on either side, as to the northward it trends S.E. towards it, and to the southward it runs W.N.W.

Karaghinskaia or *Ukinsk Bay* is formed to the northward by Cape Kouzmichtcheff. It penetrates the land for 9 miles in a N.W. direction, its breadth being from 4 to 8 miles. At the head of the bay the *River Karaga* discharges itself; its mouth is in lat. $59^{\circ} 8'$, and long. $162^{\circ} 59'$. The shores of the river itself are low, but mountains covered with wood rise at no great distance. A bed of gravel extends for 4 miles to the South of the mouth of the Karaga, and then the coast, but little elevated, turns gradually to the S.E., and forming a cape in lat. $58^{\circ} 55'$, and long. $163^{\circ} 2' E.$, which is the southern limit of Karaghinskaia Bay.

Cape Oukinskoi, which was passed at a great distance by Captain Lütke,

forms the southern limit of a very extensive gulf, 60 miles in extent from North to South, of which Karaghinskaia Bay may be placed on the North. *Cape Oukinskoi*, or *Natchikinskoi*, was considered by Captain Lütke to be in lat. $57^{\circ} 58'$, long. $162^{\circ} 47'$ East. It is low and level; the position of the high and remarkable mountain upon it is probably determined with greater precision; its lat. is $57^{\circ} 54'$, and its long. $162^{\circ} 52'$. This cape is the boundary between the Kamtschadales and the (Sedentary) Kariaks; the first dwelling to the South, the second to the North of it. The coast extends for 60 miles to the S.E., to a cape marked on the charts as *Cape Ozernoi*, in lat. $57^{\circ} 18'$, and long. $163^{\circ} 14'$ East. It is distinguished by a mountain slightly peaked.

The coast beyond this is formed of high and sloping mountains, and nothing remarkable occurs until the *River Stolbovskaia* is reached. The mouth of this river is very distinct, and is in $56^{\circ} 40\frac{1}{2}'$, and $162^{\circ} 39'$. At 10 miles from its mouth the coast begins to be mountainous, and continues so for 15 miles.

Cape Stolbovoi is a high cliff, in lat. $56^{\circ} 40\frac{1}{2}'$, long. $163^{\circ} 21'$ East. Before it are three detached rocks, one very large. The coast from the cape towards the *River Stolbovskaia* turns abruptly to the N.W., and soon afterwards to West and W.S.W. At 12 miles South from Cape Stolbovoi, in lat. $56^{\circ} 27'$, the chain of mountains is interrupted to give place to a very low valley, through which, to the W.S.W. from seaward, there was no elevation visible between the Klutchevskoi Volcano. The coast in question trends nearly upon a meridian for 35 miles South from Cape Stolbovoi. Throughout this extent, with the exception just alluded to, the coast is high and mountainous, terminating on the sea-coast often in slopes, but with cliffs in some parts, but it is throughout fronted by an extensive reef. From the above distance, the coast runs 15 miles to S.E. to Cape Kamtschatskoi.

CAPE KAMTCHATSKOI.—There was some doubt as to which was the actual cape bearing this name. The coast here forms a sloping and slightly elevated cape, which, seen from the S.E. at a great distance, would have the appearance of a remarkably prominent point.

From this cape the coast turns gradually to the S.W. and W., then runs N.W. and W. to the mouth of the *River Kamtschatka*.

It is a tortuous stream of no great size; at its mouth is the village of *Sharon*. The river was ascended by Major Abasa, a Russian officer in charge of the Siberian part of the Western Union Telegraph expeditions in August, 1865. He went from this to Tigil on the Sea of Okhotsk. *Nishni* (New) or *Lower Kamtschatka*, near the mouth of the *River Kamtschatka*, is the place to which Behring brought the naval stores, and built the boat in which he started on his voyage of discovery July 20, 1728.

The Klutchevskoi Volcano.—The great mountain of Kamtschatka lies at the back of the bay to the West and South of Cape Kamtschatkoi. Its lat.

is $56^{\circ} 8' N.$, long. $160^{\circ} 45' E.$ This volcano, called also *Kamtschatskoi*, and surnamed *Klutchevskoi* or *Klochevskaja*, from the name of the village *Klutchi* (springs), lying at its foot on the South or right bank of the River Kamtschatka, is of a truncated, but very steep, conical form. On its S.W. and N.E. sides are two other but lower mountains, the first with a serrated summit, called by the Kamtschadales the *Needle*, the second even. The volcano bears $S. 76^{\circ} W.$ from the mouth of the River Kamtschatka, and the extremity of Cape Kamtschatskoi is 20 miles S. $63^{\circ} E.$ from it. From an angular measurement, which, however, could not be repeated, Capt. Lutke calculates its height as 16,502 English feet. Professor Erman measured it as 15,766 English feet. He terms it the *Peak of Kliuchevsk.*

Dr. Erman states that he saw it in a picturesque and sublime acclivity, and approached the burning lava, which poured forth a continuous stream, till he reached the height of 8,000 feet.

CAPE KRONOTSKOI is in lat. $54^{\circ} 54'$, and long. $162^{\circ} 13'$. The intervening coast between it and the river trends S.W., South, and thence 30 or 40 miles S.E. by S. In the distance is seen the chain of high snowy mountains, extending to the Klutchevskoi Volcano. There is a large detached rock off Cape Kronotskoi. The northern shores of the Gulf of Kronotskoi, which extend inward to the South and West of the cape, were not examined by Lutke. The North shore extends to the W.N.W., and is low on the sea.

The **Kronotskoi Volcano**, 10,610 English feet in height, stands on the North side of the bay in question. Its lat. is $54^{\circ} 45'$, and long. $160^{\circ} 37' E.$ It appears to be entirely isolated, and may be seen at 120 miles distant. The Kronotskoi Volcano, like that of Villeuchinski, has the form of a regular cone, but it seems to be less steep than the latter. To the left of it is a mountain, the summit of which was flattened, and close to it a peaked hill, probably the same that was overturned during the passage of the Chevelutch Mountain from its ancient to its present site.

Between it and the Joupanoff Volcano to the southward, many high mountain summits were seen, but not forming a continuous chain. In the southern part of the bay, at 30 miles to the North of Cape Shipunskoi, a cape projects, in the neighbourhood of which the mountains recede into the interior of the country, leaving only a low coast. From this cape to Cape Shipunskoi the direction of the mountainous coast is generally North and South for an extent of 25 or 30 miles.

CAPE SHIPUNSKOI, or Tshipunski, is in lat. $53^{\circ} 6'$, and is $1^{\circ} 11' E.$ of Petropaulovski. It is the extremity of some level land, which advances 3 miles from the chain extending to the Joupanoff Volcano, and terminates on the sea-coast throughout in rocky cliffs 200 feet high. Seen from the S.W. or N.E., it has the same aspect as that of a projecting and even cape, but on the S.E. the level appearance is confounded with the other mountains. Beyond the extreme point are some detached rocks, which seem to be

united by a reef. Capt. Lutke observed a strong current off the cape which produced some overfalls.

Cape Nalatcheff is 22 miles W.N.W. $\frac{1}{2}$ W. from Cape Shipunskoi. It is a high, steep mountain, the summit irregularly rounded; it projects in a point to the South. The coast to the eastward of it is low and sandy near the sea, and rises towards a chain of moderately high mountains, but which are steep, and terminate in peaks; these extend to Cape Shipunskoi. Viewed from the S.W., this chain seems interrupted in a part where *Betchevinskaia Bay* opens. Trading vessels used formerly to visit the little *River Vakhilkaia*, which debouches 5 miles N.W. of this bay. The little *River Kalakhtyrka*, which enters the sea at 7 miles from the lighthouse cape of Avatcha Bay, is pointed out by a rock of moderate height, whitened by the dung of the sea-birds, lying 2 versts ($1\frac{1}{2}$ English miles) to the South of it.

The coast between this river and Avatcha Bay is lofty, and terminates on the coast, in many parts, in high cliffs. This space is intersected in one part by a low isthmus, between the bottom of Rakovya Bay and the sea, across which the hunters who go to take birds from Toporkoff Island transport their canoes.

AVATCHA BAY.*

This bay, the principal port of the Peninsula of Kamchatka, derives its chief interest from its containing the port of St. Peter and St. Paul, Petropaulovski, as much from its intrinsic superiority. It is so extensive and excellent, that it would allow all the navies in the world to anchor in perfect security in its capacious basin. Yet the navigator in entering it will at first see no sign of human habitation or commerce on its shores, unless, perchance, some vessel may be approaching or quitting its only port, the little town above mentioned.

It was visited by Captain (after Admiral) Beechey in H.M.S. *Blossom*, in 1827, who made an accurate and ample survey of it. In the narrative of the voyage of the French frigate *La Venus*, under Captain Du Petit Thouars, is a lengthened account of it commercially and nautically, and from these we derive the following.

The Road of Avatcha or Awatska lies at the bottom of the bay of the same name; it is reached through a narrow channel, which is 4 miles long and about 1 mile broad. This strait, although thus narrow, is not dangerous, because there is anchorage throughout its whole extent; in it, as in nearly all close channels, the winds are almost always either directly in or out of

* It is written *Awatska* by Admiral Beechey. Captain Du Petit Thouars and others write *Avatcha*; Muller says *Awatscha*; or properly, according to Kamtschadalian pronunciation, *Suatscha*. Mr. Whymper says that, notwithstanding the variety of spelling, *Avatcha* is the distinct English pronunciation of the name of the place.

it; that is, they are either contrary or favourable for passing it. The immense Bay of Avatcha, which leads to this channel, is formed by the retreat of the coast-line between *Capes Gavareah* and *Shipunskoi* or *Cheponskoi*; these two capes are the best landfalls for making the Port of Petropaulovski. In fact, whether Cape Gavareah or Cape Shipunskoi is closed with, if the vessel should be overtaken in either of these positions by thick fogs or strong winds from East or S.E., it is always possible to keep at sea; should the endeavour be to make the channel at once on its parallel, not only will the making the coast be retarded without any advantage being gained, but should she then be surprised by any contrariety, there is no means of making an advantageous tack in order to keep off, and the situation of the ship will be troublesome, there being no soundings on the coast, and neither do they offer any anchorage which could be taken in such circumstances.

If you arrive by night off the entrance to the bay, and the wind should be contrary for entering, it will be dangerous to attempt to enter the port without the assistance of a pilot, or unless well acquainted with it.

With contrary winds, with wind too light to steer, or during calm, the currents and narrowness of the entrance render the navigation difficult; but the possibility of anchoring throughout diminishes the danger. With a leading wind, the entering or leaving Avatcha Bay offers much difficulty, no danger.

the currents affect the steering, which, in a light breeze, frequently happens in the entrance, it is well to anchor in Ismenai Bay, on the East side of the entrance, or, if necessary, in any part of the channel.

Lights.—On the eastern point of the entrance a bright *fixed light* is shown, elevated 449 feet, visible 21 miles off.

A *fixed light* is shown on the inner point on the West side of the entrance, $3\frac{1}{2}$ cables N.W. by N. from Baboushka Island, elevated 294 feet, seen 9 miles off.

A *fixed light* on the inner point of the entrance on the eastern side at the signal station, about half a mile South of the entrance to Rakovya Harbour, elevated 378 feet, seen 9 miles off.

The lights at the entrance are very judiciously placed. The outer light may be approached without any risk, by means of the lead, and anchor close to it, should the wind be contrary; but if the wind is favourable for entering, from the middle of the channel, steer on to the South Signal Light on the West side, and keep it on the East tangent of Baboushka; this will bring the ship abreast of Point Staniski, and from this point, steering North or N. $\frac{1}{2}$ E., will bring you to the middle of the coast, between Point Ismenai and the North Signal Post and Light, taking care to bear North, or even N.W. $\frac{1}{2}$ N., as soon as you are to the North of the North Signal Post, and steering thus you will reach safely the anchorage of Petropaulovski. Care

must be taken, in this course, not to shut in the entrance light by the land of Point Ismenai, so as to clear the Rakovya Bank.

There is no particular precaution necessary for safety in anchoring in Avatcha Bay. The sea is never so heavy as to occasion any trouble; but as the bay is surrounded by high mountains, violent gusts are sometimes felt, so that, for greater security and quietude, it is better to have a long hawser out.

The tidal currents are very irregular, both in form and duration; they were never found more than at 2 miles in the entrance, or $1\frac{1}{2}$ mile in the road.

The HARBOUR of PETROPAULOVSKI, on the eastern side of this bay, is small, deep, and well shut in. It is defended by three raking batteries.* A vessel, of whatever size, can enter it, and undertake any description of repairs.

Tarenski Harbour, lying in the S.W. part of the bay, is immense and excellent, but as there is neither population nor trade in it, it has, up to the present time, been of no utility.

Rakovya Harbour also forms, to the South of Petropaulovski, an equally excellent port, but it is of less easy access than the foregoing, on account of the Rakovya Bank, lying in the middle of the channel leading to it.

In fine weather the morning breeze is from the North to N.N.W., lasting until eight or ten o'clock, and sometimes even until eleven o'clock; then, shifting to the West and South, it sinks altogether; in the afternoon, about one or two o'clock, the breeze from the offing sets in, varying from South towards East.

Directions.†—It is desirable to make the coast well to the southward of Cape Gavareah, and to round it as closely as possible, as the wind will, in all probability, veer to the northward on passing it. If the weather be clear, two mountains will be seen to the West and N.W. of the cape, and one far off to the northward and eastward. The eastern one of the two former, called Villeuchinski, is 7,372 feet high, and peaked like a sugarloaf,

* During the Crimean war Petropaulovski was attacked by an allied fleet of 6 ships, French and English, with a result by no means a subject of congratulation to us. On August 28th, 1854, the ships opened fire on the outer batteries, and the Russians returned it with great spirit. Ultimately an ill-judged landing was made of 700 men, during the unprotected march of whom almost all the officers were picked off. Having lost their leaders, the men fell back in disorder, and were repulsed with a loss of 107 English. The ships then bore off. This victory was the cause of very great surprise and self-gratulation to the defenders of this poor little town. When the fleet returned in the following spring, May and June, 1865, they found the place abandoned, and it fell, of course, a very easy prey.—(Mr. Whympers.)

† These directions are by Admiral Beechey, as given in the Appendix to the Voyage of the *Blossom*.

and is in lat. $52^{\circ} 39' 43''$ N., and long. $49^{\circ} 46'$ W. of Petropaulovski ($158^{\circ} 22'$ E.) The highest and most northern of the three latter is the Mountain of Avatcha, in lat. $53^{\circ} 20' 1''$ N., and $3^{\circ} 47'$ E. of the before-mentioned town. Its height is 11,500 feet, and in clear weather it may be seen a very considerable distance. The centre hill of the three is the volcano, but it emits very little smoke. These peaks are the best guide to Avatcha Bay, until near enough to distinguish the entrance, which will then appear to lie between high perpendicular cliffs. Upon the eastern one of these, the *light-house bluff*, there are a hut and signal-staff, and when any vessel is expected a light is sometimes shown. If the harbour be open, a large rock, called the *Baboushka*, will be seen on the western side of the channel, and three others, named the Brothers, on the eastern side, off the lighthouse. The channel lies in a N. by W. direction, *true*; and when the wind is fair, it may be sailed through by keeping mid-channel; but it frequently happens that vessels have to beat in, and as the narrowness of the channel renders it necessary to stand as close to the dangers as possible, in order to lessen the number of tacks, it is requisite to attend strictly to the leading marks.

The outer dangers are a reef of rocks lying S.E., about 2 miles from the lighthouse bluff, and a reef lying off a bank which connects the two capes opposite, *i. e.*, *Staniski Point*, with the cape to the southward. To avoid the lighthouse reef, do not shut in the land to the northward of the lighthouse bluff, unless certain of being at least $2\frac{1}{2}$ miles off shore, and when within three-quarters of a mile only, tack when the lighthouse bluff bears North, or N. $\frac{1}{2}$ E. The Brothers Rock, in one with the lighthouse, is close upon the edge of the reef. The first western danger has a rock above water upon it, and may be avoided by not opening the Baboushka with the cape beyond, with a flagstaff upon it, or by keeping Staniski Point well open with the said signal bluff. In standing towards this rock, take care that the ebb tide in particular does not set you upon it. A good working mark for all this western shore is the Baboushka open with *Direction Bluff*, the last cape or hill on the *left upon the low land*, at the head of Avatcha Bay. The bay South of Staniski Point is filled with rocks and foul ground. The lighthouse reef is connected with the Brothers, and the cape must not be approached in any part within half a mile, nor the Brothers within a full cable's length. There are no good marks for the exact limit of this reef off the Brothers, and consequently ships must estimate that short distance. They must also here, and once for all, in beating through this channel, allow for shooting in stays, and for the tides, which, ebb and flood, sweep over toward these rocks, running S.E. and N.E. They should also keep good way on the vessel, as the eddy currents may otherwise prevent her coming about.

To the northward of the Brothers, two-thirds of the way between them and a ragged cape, at the South extreme of a large sandy bay (*Iamenai*

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Bay), there are some rocks nearly awash; and off the rugged cape called *Pinnacle Point* (N.N.W. $1\frac{1}{2}$ mile from the lighthouse), there is a small reef, one of the outer rocks of which dries at half-tide. These dangers can almost always be seen; their outer edges lie nearly in a line, and they may be approached within a cable's length. If they are not seen, do not shut in the Rakovya signal bluff. Off Pinnacle Point the lead finds deeper water than mid-channel, and very irregular soundings.

To the northward of Staniski Point the Baboushka may be opened to the eastward a little with the signal bluff, but be careful of a shoal which extends about 3 cables' lengths South of the Baboushka. Baboushka has no danger to the eastward, at a greater distance than a cable's length; and when it is passed, there is nothing to fear on the western shore, until N.N.W. of the signal staff, off which there is a long shoal, with only 2 and $2\frac{1}{2}$ fathoms. The water shoals gradually toward it, and the helm may safely be put down in $4\frac{1}{2}$ fathoms; but a certain guide is, not to open the western tangent of Baboushka with Staniski Point South of it. There is no other danger on this side of the entrance.

When a cable's length North of Pinnacle Reef, you may stretch into Ismenai Bay, guided by the soundings, which are regular, taking care of a 3-fathom knoll which lies half-way between Pinnacle Point and the cape North of it. This bay affords good anchorage, and it may be convenient to anchor there for a tide. There is no other danger than the above-mentioned knoll. The large square rock at the northern part of this bay (Ismenai Rock) may be passed at a cable distance. This rock is connected with the land to the northward by a reef, and in standing back towards it, the *Pinnacle Point* must be kept open with the *lighthouse*. When in one, there are but $3\frac{1}{2}$ fathoms. Rakovya signal-staff or lighthouse to the northward, in one with the bluff South of it (which has a large green bush overhanging its brow), will place you in 5 fathoms, close to the rocks.

Off the North bluff of Ismenai Bay there extends a small reef to a full cable's length from the shore; until this is passed do not shut in Pinnacle Point with the lighthouse. But to the northward of it you may tack within a cable's length of the bluffs, extending that distance a little off the signal-staff bluff, in consequence of some rocks which lie off them.

Northward of Rakovya signal-staff the only danger is the Rakovya Shoal, upon the West part of which there is a buoy in summer, and to clear this keep the Brothers *in sight*.

There is no good mark for determining when you are to the northward of this shoal, and as the tides in their course up Rakovya Harbour are apt to set you towards it, it is better to keep the Brothers open until you are certain, by your distance, of having passed it (its northern edge is seven-eighths of a mile from Rakovya bluff), particularly as you may now stretch to the westward as far as you please, and as there is nothing to obstruct

your boat up to the anchorage. The ground is everywhere good, and a person may select his own berth.

Rakovya Harbour, on the eastern side of Avatcha Bay, will afford good security to a vessel running in from sea with a southerly gale, at which time she might find difficulty in bringing up at the usual anchorage. In this case, the Rakovya Shoal must be rounded, and left to the northward; 5 and 5½ fathoms will be close upon the edge of it, but the water should not be shoaled under 9 fathoms.

The little Harbour of Petropaulovski is a convenient place for a refit of any kind. In entering, it is only necessary to guard against a near approach to the signal-staff on the peninsula on the West. The sandy point may be passed with a few yards' distance.

Weighing from the anchorage, off the peninsula flagstaff, with light winds, and with the beginning of the ebb, it is necessary to guard against being swept down upon the Rakovya Shoal, and when past it, upon the signal bluff on the same side. There are strong eddies all over this bay, and when the winds are light, ships often become unmanageable. It is better to weigh with the last drain of the flood.

Tareinski Harbour, at the S.W. angle of Avatcha Bay, is an excellent port, but it is not frequented. It has no dangers, and may be safely entered by a stranger.

It is high water at Petropaulovski at 3^h 30^m full and change; the tide rises 6 feet 7 inches spring tides, and 2 feet 2 inches neap tides.

The church at Petropaulovski is in lat. 53° N., long. 158° 43' 30" E.

PETROPAULOVSKI stands in an amphitheatre on the slopes of two hills, which form the valley, and is simply composed of a group of small wooden houses, covered with reeds or dry grass, and surrounded by courts and gardens, with palisades. At the lower part of the town, in the bottom of the valley, is the church; it is remarkable for its fantastic construction, and for its roof, which, painted green, seems to add considerably to the effect of the picture, surrounded as it is by lofty mountains.

In approaching *Point Shakoff*, as the extremity of the peninsula forming the harbour was named, and in which is a battery, perhaps a white buoy will be seen, marking the extremity of a bank having 3 fathoms on it, extending nearly a quarter of a mile S.S.E. (*true*) from it. This may be passed close to it,* leaving it to the left, and thence steer to the end of a low point of land which projects at an angle of about 45° from the direction of the

* By keeping the South end of the cliff under the cemetery bearing N.E., until within a cable's length of the beach, when the church of Petropaulski will appear in the centre of the valley, leads southward of this shoal, after which the direct channel to the inner harbour of Petropaulski has nothing less than 6 fathoms.—Valentine G. Roberts, Master, R.N., H.M.S. *President*, 1855.

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coast, and nearly closes the bottom of the bay, making it into an excellent natural harbour, the best that can be desired. This tongue of land, like an artificial causeway, is but little above the surface of the water, and is now covered with *balagans*, huts raised on piles above the ground, serving to dry fish. In the early days of the Russian occupation it was the site of the colony. Arrived at the bottom of the port you land on a plank, which holds the place of a mole. Turning to the left down a good street, broad and macadamized, after passing the government workshops in the centre of Petropaulovski, turning to the right after passing them, and crossing a wooden bridge, you pass the church on the right hand, and then reach the government offices. These two streets are all that merit the name.

Mr. Whympere, who was here in 1865 and 1866, says: With the exception of a few decent houses, the residences of the Russian officials and foreign merchants, the town makes no great shew. The poorer dwellings are very rough indeed, and are almost exclusively rude log cabins. The only noticeable building is the old Greek church, which has painted red and green roofs, and a belfry entirely detached from the building. It is to be remarked that the town, as it existed in Captain Clerke's time, was built on the sand-spit, but no remains or indications of it were seen by us. Petropaulovski was once a military post, and had a rather larger population than at present. The Cossack soldiers have now been removed to the Amoor.

The Russian-American Company had at one period stations in Petropaulovski, and other parts of Kamchatka, but abandoned them, owing doubtless to the competition of private traders. It is now one of the centres of the fur trade, but Nijni (new) Kamchatka is the present capital. Bolcheretsk was considered the principal town formerly, but has dwindled down to an inconsiderable village, and indeed the population, and with it the production of Kamchatka, is on the decline. Yet the climate is by no means so bad as commonly believed. Colonel Bulkley, of the Telegraph Expedition, considered that it was better than that of some of the New England States and Canada, and was quite certain that agriculture was possible.

A vessel in need of repair will only find safe anchorage in Avatcha Bay, and must depend on her own resources both for provisions and workmen; for there is no certainty in obtaining wood or water, still less any refitments for the ship. It is, however, possible to procure, in urgent cases, some slight aid from the Government stores, and some workmen of the port; but these assistances, besides being limited, are very precarious. Wood and water are easily obtained. A supply of fresh beef may be procured, and a little fresh butter, but it is difficult to get poultry or eggs. There are no sheep nor pigs. Fish is abundant in the bay in the season; it begins with cod and is followed by salmon and salmon trout.

The Coast.—The eastern coast of Kamchatka, between Cape Gavareah
North Pacific.

and Cape Lopatka, trends to the S.W. South of *Achachinskoi* the land is not so high and broken as between that bay and the mouth of Avatcha Bay. The coast is steep and bold, and full of white chalky patches. About 7 leagues S. by W. of Cape Gavareah is a high headland, and between them are two narrow but deep inlets. The hills break abruptly, and form chasms and deep valleys, which are well wooded. *Achachinskoi Bay*, in lat. $51^{\circ} 54'$, is formed to the northward by a point, and penetrates deeply into the land.*

CAPE LOPATKA is the South part of Kamtchatka, and is in lat. $50^{\circ} 49'$, long. $156^{\circ} 50'$. It is a very low, flat cape, sloping gradually from the high level land to the North, and to the N.W. of it is a remarkably high mountain. Its name, Lopatka, signifies the bladebone of a man, or a shovel, and is expressive of its form. It extends from the South end of the peninsula 10 or 15 miles, and is about half a mile broad.

The passage between this cape and the N.W. Kurile Island is about 3 miles broad, and very dangerous, on account of the strong currents and the sunken rocks off the cape.

KURILE ISLANDS.

This extensive chain of islands extends nearly in a uniform N.E. and S.W. line from the South extremity of Kamtchatka to the North point of the Island of Jesso, a distance of 650 miles.

The *Boussole Channel* separates the chain into two portions; that to the northward belonging to Russia; the southern islands formed a portion of the Japanese possessions, but later events have altered their relation.

The northern portion is all apparently of volcanic origin; indeed the whole chain may be looked upon as a series of submerged mountains, a continuation of the mountain chain traversing Kamtchatka through its whole length.

Of the Japanese portion the most considerable islands are Urup, Iturup, Kunashire, and Tschikotan or Spanberg Island. On these there are

* It was on this part of the coast that the singular occurrence of the wreck of a Japanese vessel occurred in July, 1729, at the Sandwich islands. All these facts, which doubtless might be multiplied, would tend to prove that the winds and currents in the western portion of the North Pacific have a great analogy to those of the North Atlantic; the same progress of the cyclones, or revolving storms, and the same drift of the N.E. The vessel in question was from Satsuma, in Japan, bound for another Japanese port called Ozaka (Ohosaka?). She was driven from her course by a violent storm to sea, where they remained for 6 months, and at last reached this coast and cast anchor. The crew, seventeen in number, landed and encamped, but they were all shot but two by a treacherous Cossack. The two survivors were sent to St. Petersburg to be educated.

military posts for defence, and establishments for facilitating the commerce with the Ainos, the native inhabitants. The name Kurile is derived from the Kamtchadale word for "smoke," the volcanic islands having been seen from Lopatka.

Our acquaintance with the configuration of the Kurile Islands may be considered as tolerably complete. This result was one of the most difficult problems in hydrography. The fog in which the group is constantly enveloped; the violent currents experienced in all the passages or straits separating them; the steepness of their coasts, and the impossibility to anchor near the land, are such formidable obstacles, that it tries to the utmost the patience and perseverance of the mariner to acquire any knowledge respecting them. We are indebted to a Russian commander, Capt. Golownin, or Golovnine, who, in 1811, was charged with the survey in the *Diana*; this was completed with the exception of the North sides of Kunasiri and Iturup. Besides this, we have the observations of Admiral Krusenstern in the *Nadijeda*, in 1805; of La Pérouse and Broughton, before alluded to; of Langman, Spanberg, and by other Russian officers; and also a chart by the surveyor Gilaeff, made in 1790.

Alaid is the northernmost of the Kurile Islands. It is small, and in lat. $50^{\circ} 54' N.$, long. $155^{\circ} 32' E.$ It lies rather within or to the West of the general line of the archipelago.

SUMSHU ISLAND would, therefore, be reckoned as the first island in reckoning from Kamtchatka, Alaid not properly forming part of this group. Its southern extreme terminates in a tongue of low land; the North end is the same, and is distant 10 miles from Cape Lopatka, in a S.W. $\frac{1}{4}$ W. direction. The island extends about 10 miles in a North and South direction, and its centre lies in lat. $50^{\circ} 46'$, long. $156^{\circ} 26' E.$

POROMUSHIR ISLAND is among the largest of the archipelago, being 20 leagues in length from N.E. to S.W. Its southern part is very mountainous, the S.W. portion less so. There is also a high mountain in lat. $50^{\circ} 15'$, long. $155^{\circ} 24' 15''$. Krusenstern says, "We could not approach the N.E. extremity, which was hidden by the Island of Sumshu, separated from that of Poromushir (or Paramushir) by a channel of a mile at most in breadth. We nevertheless saw the South point of this last island over the low land of the extremity of Sumshu, and on a line with Alaid Island, which then bore N. $66^{\circ} W.$

Shirinky Island, which lies off the S.W. extremity of Poromushir, according to Krusenstern's chart, and on which point is marked a peak, probably a volcano, is small, being not more than 2 miles in diameter. It lies in lat. $50^{\circ} 10' N.$, long. $154^{\circ} 58' E.$ On Aug. 26, 1805, at noon, the *Nadijeda* was within 4 miles of it. It then bore from N. $2^{\circ} E.$ to N. by E.

Monkonrushy Island is rather larger than the last, and is nearly of the same form. It lies in lat. $49^{\circ} 51' N.$, long. $154^{\circ} 32' E.$

Avos Rock.—Lieutenant Khwostoff discovered in June, 1806, a rock lying 8 miles to the S.W. of Monkonrushy Island, to which he gave the name of Avos, because, in first seeing it, he thought it was his consort, which was so named. This rock is surrounded by a dangerous reef, formed of rocks even with the water's edge.

ONNEKOTAN ISLAND is 28 miles in extent from N.E. $\frac{1}{4}$ N. to S.W. $\frac{1}{4}$ S. Admiral Krusenstern having sailed along its western shores at a short distance, it was distinctly seen, which was not the case with its eastern face, which was passed a long way off. The S.W. point, then named *Cape Krenitsen*, lies in lat. $49^{\circ} 19' N.$, long. $154^{\circ} 44' E.$; and its S.E. extreme at about 2 miles still further to the South.

The *Amphitrite Channel* or strait which separates this island from that of Poromushir is 19 miles broad. It is very safe; all ships going from Okhotsk to Kamtschatka, or to the American coast and returning, use this channel in preference.

KHARAMUKOTAN ISLAND (or Kharim-kotan) lies S.W. $\frac{1}{4}$ S. 8 miles from Onnekotan. Although the channel separating these two islands is safe, the currents in it are so violent, that with light winds, or if overtaken by a calm, the passage would become dangerous. The island is of a round form; its diameter is 7 miles; a peak rising in its centre lies in lat. $49^{\circ} 8' N.$, long. $154^{\circ} 39' E.$

SHIASHKOTAN ISLAND lies 8 miles S.W. $\frac{1}{4}$ W. from Kharamukotan, and is 12 miles long in a N.N.E. and S.S.W. direction. Its centre is in lat. $48^{\circ} 52' N.$, long. $154^{\circ} 8' E.$ *Elkarma Island* is situated to the North of it, not more than a mile off.

Tshirinkotan Island, or Chirin-kotan, is small, and scarcely more than 7 miles in circuit. It lies 8 leagues to the West of the South end of Shiashkotan, in lat. $48^{\circ} 44' N.$, long. $153^{\circ} 24' E.$

The Snares.—On August 30, 1805, Krusenstern discovered four small islets, or rather rocks, one of which is awash. He named them the Snares, on account of the danger he was in from the currents he risked so unexpectedly. The strong currents around these rocks will always cause great embarrassment to every ship that passes near them. They lie S.E. $\frac{1}{4}$ E. from Tshirinkotan, in lat. $48^{\circ} 35' N.$, long. $153^{\circ} 44' E.$

Raukoko or Raikoke Island is small but hilly. It has a high peak, lying in lat. $48^{\circ} 16' 20'' N.$, long. $153^{\circ} 15' E.$

Mataua Island lies directly to the South of Raukoko. *Golownin Strait*, which separates these two islands, is 8 or 10 miles in breadth. Mataua Island is 6 miles in length from North to South. *Sarytscheff Peak*, standing in its centre, is situated in lat. $48^{\circ} 6' N.$, long. $153^{\circ} 12' 30'' E.$

Rashan Island, in lat. $47^{\circ} 47' N.$, long. $152^{\circ} 55' E.$, is about 5 leagues in circumference; it lies to the South of Mataua Island. Krusenstern named the strait which separates these two islands *Nadiegeda Strait*, because his

vessel was the first which passed it, in 1805. This channel is 16 miles broad. It is very safe, but the currents in it are violent.

At this part terminates the observations of Admiral Krusenstern, and those of Captain Golownin commence.

Ushishir Island succeeds to Rashau. It is composed of two islands, connected by a reef of 400 yards in length; each of these two small islands is about half a league in length, N.N.E. and S.S.W. A reef of rocks extends from the northernmost of these islands towards Rashau; these rocks are terminated by a small islet named *Srednoy*. It lies 10 miles to the S.W. from the southern extremity of Rashau, and N.N.E. $3\frac{1}{2}$ miles from the northernmost of the *Ushishir Island*. Its extent, East and West, is 1 mile. The channel which separates Ushishir from Ketoy Island is very safe. The southern point of Ushishir is in lat. $47^{\circ} 32' 40''$ N., and long. $152^{\circ} 38' 30''$ E.

Ketoy Island lies $12\frac{1}{2}$ miles to the S.W. of Ushishir. It is high and mountainous, and about 8 miles in circumference. Its South extremity lies in lat. $47^{\circ} 17' 30''$ N., long. $152^{\circ} 24'$ E. Some rocks and islets extend for a considerable distance off its N.E. and East sides.

SIMUSIR ISLAND is 27 miles in extent N.E. and S.W., and 5 miles in breadth. It has a circumference of 25 leagues. In the northern part of it there is a bay, which was also seen by Captain Broughton, after whom it is named; although it is very spacious, this port is only navigable for small vessels, on account of a reef lying in the middle of its entrance. At high water there are only 12 to 15 feet, and at low water 6 feet depth in it. The peak named by La Pérouse *Prevost Peak*, is situated about 10 miles to S.W. from the N.E. point of the island, and lies in lat. $47^{\circ} 2' 50''$ N., long. $151^{\circ} 52' 50''$ E. At the southern extremity of the island, named by La Pérouse *Cape Rollin*, there is a high mountain, in lat. $46^{\circ} 51'$ N., long. $151^{\circ} 37'$ E. The strait separating the Islands of Ketoy and Simusir has the name of *Diana Strait*.

Broughton, Rebuntsiriboi, and Brat Chirnoef Islands, are between Simusir and Urup, the next large island to the N.E. The northernmost, Broughton or *Makanruru Island* (Round Island of Broughton), is of good height, bold, and abrupt, sloping a little to the southward, near which end are some rocks, and apparently the only place where a landing could be effected.

The two other islands, Rebuntsiriboi or Chirnoi, and Brat Chirnoef or Chirnoi Brothers, lie N.N.E. and S.S.W. from each other, distant $1\frac{1}{2}$ miles. Rebuntsiriboi, the northernmost of the two, is remarkable from its having two conspicuous peaks of sugar-loaf form. A reef, which much resembles an artificial breakwater, extends a mile East from its North point, and at its extremity there is a high rock.

URUP ISLAND is the nearest land to the S.W. It was named by the Dutch *Company's Island*. The N.W. point is hilly, as is all the island,

which is covered with mountains, many of which are very high. It is 18 leagues in extent from N.E. to S.W., and its greatest breadth is about 5 leagues. Near its centre there is a remarkable peak, in shape like a haystack, which can be seen in clear weather at 50 miles, and is often visible when the other portion of the island is obscured by fog. A chain of rocks runs off from its N.E. point for a distance of 5 miles, in an E.N.E. direction, and at the distance of a mile from the shore there is a large rock of a pyramidal form, with two others smaller; the first is sufficiently high to be seen in clear weather at 7 leagues' distance. The northernmost point of the island, named by La Pérouse *Cape Castricum*, lies in lat. $46^{\circ} 16' N.$, long. $150^{\circ} 22' E.$, and the southernmost point, named by the Dutch *Cape Van der Lind*, in lat. $45^{\circ} 39' N.$, long. $149^{\circ} 34' E.$ At half a mile off the South point of the island, bearing S.W., is a rock of a circular form. The S.W. point of the island is low and steep, and continues so for about 15 miles in a northerly direction, when it rises to a lofty mountain range; a high and almost perpendicular rock, appearing like a sail when seen at a distance, lies S.E. about 1 mile from the point.

Port Tavano is a small harbour on the eastern side of Urup, but it is open to the eastward, and with the wind from that quarter a heavy swell rolls in, which, with the shallow water and rocks it contains, do not recommend it as a safe anchorage. The entrance has 8 and 10 fathoms water, and is 120 yards across; nearly in the centre of the port there are some rocks just above water, with $4\frac{1}{2}$ and 5 fathoms close to. Water is procured from two rivers at the head of the harbour. Salmon and rock fish are plentiful. It was taken possession of by two French frigates on Sept. 3, 1865.

ITURUP or Yeterop Island, or *Staaten Island*, is separated from Urup by the *Strait of De Vries*, discovered in 1643. The N.E. point of the former, *Cape Okebets*, is high and perpendicular, and is also remarkable by three paps; it lies in lat. $45^{\circ} 38' 30'' N.$, long. $149^{\circ} 14' E.$, the breadth of the strait is consequently $13\frac{1}{2}$ miles in an East and West direction. The South point of Iturup, *Cape Tesiko*, but which Krusenstern names *Cape Rikord*, lies in $44^{\circ} 29' N.$ and $146^{\circ} 34' E.$ The island is therefore 125 miles in extent from N.E. $\frac{1}{2} E.$ to S.W. $\frac{1}{2} W.$ Its greatest breadth is about 6 leagues. Captain Golownin only examined the southern part of the island; the N.W. cape was named by La Pérouse *Cape de Vries*; according to his observations it lies in lat. $45^{\circ} 37' N.$, long. $149^{\circ} 1' E.$ The Japanese had two establishments, *Sana* and *Urbisah*, on the S.W. part of Iturup.

Tschikotan, Sikolan or Spanberg Island.—To the South of the S.W. point of Iturup is the Island Tschikotan, which is called by Capt. Broughton Spanberg Island. It is called in Cook's voyage, *Nadeegsda*.

The centre of the island, according to Golownin, is in lat. $43^{\circ} 53' N.$, long. $146^{\circ} 43' 30'' E.$ The island is only 5 miles long in one direction, East and West, and about the same North and South. In the centre of the

island there rises a mount, even and uniform to the summit. It is said that a good harbour will be found in the S.W. part of the island. At 9 or 10 miles distance from Tschikotan, bearing S.W. $\frac{1}{4}$ W., there are several rocky islets. The space comprised between Jesso and Tschikotan, is the *Walvis Bay of De Vries*, in the same way that the small islets we have just described, between Jesso and Tschikotan, were named Walvis Islands.

KUNA-SIRI, or *Kunashire Island*, is the last of the Kuriles. It is separated from Iturup by the *Pico Channel*. It was first traversed in 1643, by Captain Vries: next Captain Loffzoff, in the Russian ship *St. Catherine*, in 1793; Captain Broughton, in 1797; and Captain Golownin, in 1813, have successfully passed through this strait. Krusenstern named the N.E. point *Cape Loffzoff*; it is in lat. $44^{\circ} 29' 15''$ N., long. $146^{\circ} 8'$ W.; the latitude is precisely the same as that of the South point of Iturup, so that the channel between is 16 miles in width, East and West.

St. Antony's Peak, called by the natives Tschatchanobury, stands near the N.E. point.

The S.W. part of Kunashire forms a bay, named by the officers of the *Diana*, the *Bay of Traitors*, because it was here that the Japanese, after inviting Captain Golownin to land, seized him and made him prisoner. The two points forming the bay lie in a N. 60° W. and S. 66° E. direction, $11\frac{1}{2}$ miles one from the other. The flood tide, which hardly rises beyond 4½ feet, comes from the East, and directs itself along the coast, and turns around the S.W. point towards the strait which separates Kunashire from Jesso, and called the *Strait of Jesso*. The Japanese establishment on the Bay of Traitors is in lat. $43^{\circ} 44'$ N., long. $144^{\circ} 59' 30'$ E.

SEA OF OKHOTSK.

The Sea of Okhotsk, surrounded as it is on all its northern and western sides by the continent, and to the S.E. by the range of the Kurile Archipelago, may be considered as completely land-locked. In this respect, as well as in size and general situation, it is not unlike Hudson's Bay.

The coast to the S.W. of Okhotsk was surveyed, but not verbally described, by Sarytscheff and Tomine; and of the Shantar Islands, and the great Peninsula of Saghalin, we have the details given by Broughton and Krusenstern. In addition to these we have some details in the Russian charts of 1849—51, but nothing satisfactory.

We have few particulars respecting the open sea, its currents or its soundings; but it is known to resemble the Sea of Behring in its shallowness, so that, at its centre, it is never above 200 fathoms, nor more than 50 fathoms at 50 miles off the land. The shores are closely surrounded by

mountains, which occasions all the rivers, with one exception, to be insignificant in their magnitude.

The only river falling into this vast basin is the Amur, if indeed the Amur can fairly be said to do so, terminating as it does in a bay, which, being bounded in front by the Island or Peninsula of Saghalin, opens by one strait into the Sea of Okhotsk, and, perhaps, by another in the Sea of Japan.

One feature of interest in this remote expanse of waters is the field it offers for the whale fishery. These have at times been found to be very numerous, and of late years the hardy American whalers have here pursued successfully their gigantic game.

Whaling vessels frequent this sea from the beginning of July to the beginning of October, few, if any, being in it by the 10th of October. The shores are covered with ice from November to April, but the main expanse continues open throughout the year, and being generally deep without any apparent danger, its navigation is safe, notwithstanding the fogs and storms with which it is often visited.

In former years, as has been before stated, the whaling fleet interfered very greatly, by their trading, with the privileges of the Russian-American Company, a fact which formed one great inducement for the Russian Government to transfer the Territory of Alaska to the United States. Since that transfer, the Governor-General of Eastern Siberia has declared that the Sea of Okhotsk shall be considered as a closed sea, and that vessels which enter it for the whale fishery shall pay a duty equal to 10 roubles per annum. The number of vessels hitherto so engaged here has varied from 200 to 500.

CAPE LOPATKA, the South extremity of Kamtchatka, has been described on page 562.

The western coast of Kamtchatka is uniformly low and sandy, to the distance of about 25 to 30 miles inland, when the mountains commence. It produces only willow, alder, and mountain ash, with some scattered patches of stunted birch trees. The runs of water into the sea from the mountains do not, with the exception of the *Bolshaya* or *Bolchoireka*, deserve the name of rivers, though they are all well stocked with fish from the sea in the season, as trout, and different species of salmon. They are generally at the distance of 15 to 20 miles from each other. The *Itsha* and the *Tigil* are the most considerable; and neither of them have a course, with all the windings, of more than 100 miles.

Bolcheretskoi is the place that is best known to Europeans on the West coast, though its present insignificance scarcely deserves notice. It was the seat of the government of Kamtchatka previous to its removal to Petropaulovski. Of course this abstraction has diminished its little importance, and it is therefore seldom or never visited now by commercial vessels. The

expeditions under Captains Cook and Clerke visited it overland from Avatcha Bay. Captain King's description of it is as follows:—"Bolcheretskoi is situated in a low smampy plain, that extends to the Sea of Okhotsk, being about 40 miles long, and of a considerable breadth. It lies on the North side of the *Bolchoireka* (or great river). Below the town the river is from 6 to 8 feet deep, and about a quarter of a mile broad. It empties itself into the Sea of Okhotsk, at the distance of 22 miles; where, according to Krachenninikoff, it is capable of admitting vessels of a considerable size.

Off the western coast of Kamchatka the sea is shallow to a considerable distance; and the commanders of transport vessels, who never lose sight of the exposed coast if they can help it, judge of their distance from the land, in foggy weather, by the soundings, allowing a fathom for a mile; nor is there at the entrance into any of the rivers more than 6 feet at low water, with a considerable surf breaking on the sandy beach.

The villages on this coast, beyond Bolcheretskoi, are Itshinsk and Tigilsk, situated on the *Tigel* or *Tigil* and *Itsha Rivers*. *Itshinsk* contains a church, and about ten houses.

Tigilsk, or *Fort Tigel*, in lat. $58^{\circ} 1' N.$, long. $158^{\circ} 15' E.$, is the principal place. Sauer says it contained forty-five wooden houses and a church. It is called by the Russians a fortified town, is surrounded by wooden palisades, and was built in 1752. It is a place of some importance in Kamchatka, as the Koriak and Tehuktehi tribes gather around it in January, to exchange their furs for tea, coffee, powder, lead, &c.

Besides these, there are eight inconsiderable villages, containing each three or four houses, on the West coast.

The GULFS of GHIJINSK and PENJINSK, which form the N.E. portion of the Sea of Okhotsk, are but very little known in a nautical view. They run to the N.E., between *Cape Uholotskoi* on Kamchatka, lat. $57^{\circ} 50' N.$, long. $157^{\circ} 18' E.$, and *Cape Bliqan*, in lat. $58^{\circ} 40'$, long. $152^{\circ} 20'$, and extending as far North as $62^{\circ} 25'$. They are separated by a promontory, terminating in *Cape Taigonotskoi*.

Pustaresk, according to M. Lesseps in 1788, lat. $61^{\circ} 0' N.$, long. $162^{\circ} 30' E.$, is a small village on the side of a hill, the foot of which is bathed by the sea. The river cannot be called such; it is merely a narrow inlet of the sea, reaching to the foot of the above mountain.

Kaminoi, at the head of *Penjinsk Gulf*, is an *ostrog*, or village, about 300 versts distant from Pustaresk. It is on an elevation nearly on the sea shore, and at the mouth of the River Penjina, in lat. $62^{\circ} 0' N.$, long. $162^{\circ} 50' E.$

Ghijega, or *Fort Jijiginsk*, lat. $61^{\circ} 40'$, long. $160^{\circ} E.$, at the head of the gulf to which it gives its name, stands on the river of the same name, and from without appears as a square enclosure defended by a palisade, according to M. de Lesseps. The houses are all of wood, very low, and nearly all

of a uniform elevation. The population were all members of, or attached to the Russian service. The commerce is chiefly in furs, and that principally reindeer skins.

The Ghijinsk of the charts is situated on the river of the same name, about 8 miles from the coast of the Ghijinsk Gulf. It is an insignificant village of two or three hundred people, but it has more importance than its size would lead to the belief. It is the seat of the local government, and is a centre of trade with regard to the fur trade of the district. It is also the only place for several hundred miles around where the poor Russian settler, or the semi-civilized Kamtchatdale, can get any tea, sugar, or vodka (whiskey). The governor, or Isprasnik, has only 25 Cossacks under him, and has no power to visit a hundredth part of his immense territory.—(Mr. Whymper.)

It was made one of the stations of the intended Western Union Telegraph route. Mr. Knox, who came here in the summer of 1866, in charge of this part of the expedition, does not describe it as a territorial paradise.

The extent of coast between this and Okhotsk we have not found any description of.

OKHOTSK is the principal seaport, if it deserve such a name, of the sea to which it gives the appellation. It stands on the N.W. side of the sea, in lat. $59^{\circ} 20' N.$, long. $143^{\circ} 14' E.$

The shallowness of the water a long way off from the entrance of the harbour, and the violence and cross set of the tides at the harbour's mouth, preclude the possibility of Okhotsk being an easily accessible port, except for a small vessel. Necessity alone can induce the Russian government to keep it at such an expense, and under its present circumstances.

Okhotak was visited by Sir George Simpson in his overland journey. He arrived here from Sitka, June 27th, 1842. "Okhotsk, now that we had reached it, appeared to have little to recommend it to our favour, standing on a shingly beach so low and flat as not to be distinguished at our distance from the adjacent waters. We saw nothing but a number of wretched buildings, which seemed to be in the sea, just as much as ourselves; while, from their irregularity, they looked as if actually afloat; and even of this miserable prospect one of the characteristic fogs of this part of the world begrudged us fully one-half."

The tongue of land, about three-quarters of a mile in length, and one-quarter of a mile in width, is so little elevated above the level of the sea, that when the southerly wind blows hard or continues long, the whole is almost sure to be inundated. The town lies about half a mile distant, situated on the left bank of the Kuchtui.

A more dreary scene can scarcely be conceived. Not a tree, and hardly even a green blade, is to be seen within miles of the town, and a stagnant marsh in the midst of it must be, except when it is frozen, a nursery for all sorts of malaria. The soil is on a par with the climate. Summer consists

of three months of damp and chilly weather, succeeded by nine months of dreary winter, as raw as it is intense. The principal food of the inhabitants is fish. The Sea of Okhotsk yields as many as fourteen varieties of the salmon alone, one of them, the nerker, being the finest thing of the kind ever tasted. Fish is also the staple food of cattle and poultry. All other supplies for the table are ruinously extravagant, as much of the stores is burdened with a land-carriage of 7,000 miles. On such fare, and in such a climate, no people could be healthy. Scurvy, in particular, rages here every winter.

Okhotak has declined since Nicolaiefski was established, the interest having been much drawn to the latter place. It is said to have about 500 inhabitants.

Bad as the Harbour of Okhotsk is, it is believed to be the best in the Sea of Okhotsk. The coast between Okhotsk and Fort Oudskoi has been surveyed by the Russian Vice-Admirals, Sarytscheff and Tomine, so we may suppose them to be well represented on the charts.

PORT AIAN or **Ayan**, on the western coast of the Sea of Okhotsk, may be recognized from the southward by *Cape Vneshnei* or Outer Cape, a high barren promontory with several craggy peaks upon it, at a mile eastward of its eastern point of entrance. The coast in the neighbourhood is high and bold.

The inner part of the port is from one quarter to half a mile wide, and three-quarters of a mile deep, and affords good shelter for small vessels, in 2 to 4 fathoms, muddy bottom. On the West side of the entrance is a reef of rocks, with 4 fathoms close-to, barely covered at high water; the eastern shore is steep, and may be closely approached.

The climate here is abominable, and fogs are uninterrupted; the ice breaks up in June, and snow does not always disappear before August. The port is frozen over in November.

Supplies are scarce in Port Aian, and difficult to be obtained. To the southward of the entrance is a sandy bay, in which the soundings appear to be regular, and where water may be conveniently procured. Scurvy is common and fatal among the inhabitants, but the wild rhubarb growing close to the sea in many parts of the harbour, is of great service as an anti-scorbutic.*

* Ayan was visited by the allied squadron, and taken possession of in July 10th, 1855. Mr. J. M. Tronson, who was on board H.M.S. *Barracouta*, gives a description of the place, and their visit (pages 123—132). He says, "As we entered the port we could not but admire the beautiful scenery of this calm retreat, notwithstanding our warlike mission. On each side of the port a prominent headland projects. Cape Vneshnei, the outer cape, is in

JONAS or **St. Jonas Island**, a collection of naked rocks, discovered by Captain Billings in the Russian corvette *Slava Rossi*, lies off this portion of the coast. Its position was ascertained by Admiral Krusenstern, in 1806, as lat. $56^{\circ} 25' 30''$, long. $143^{\circ} 16' E.$ It is about 2 miles in circumference, and 1,200 feet high. Off its West side this islet is entirely surrounded by detached rocks, against which the waves beat with great violence, and which extend a considerable distance below the surface of the water.

Fort Oudskoi (**Oudskoi Ostrog**), a considerable establishment, was determined by Lieutenant Kosmin, in 1829—30, to be in lat. $54^{\circ} 29' N.$, long. $134^{\circ} 58' E.$ Fort Oudskoi, or Ouda, lies on the left bank of the River Ouda, at above 20 miles from its mouth, which is in lat. $54^{\circ} 44' N.$, long. $134^{\circ} 25' E.$

The **SHANTAR** or **Shantarski Islands** were also surveyed by Lieutenant Kosmin, who accompanied Captain Wrangel in his Siberian expeditions. From that survey it appears that the principal of the group is *Great Shantar Island*, which is 35 miles long, in an East and West direction, and of an equal breadth from North to South. Notwithstanding this extent of coast, it does not appear to afford any port, but the S.W. point of the island projects to the S.W., so as to form an open bay to the eastward of it. Between this point and *Cape Nikla* and *Dougangea*, the nearest point of the continent, 14 miles distant, are two isles, *Barrier* and *Duck Islands*. These are surrounded by rocks and reefs; one of these rocks is 30 feet high. The North point of *Great Shantar* is in lat. $55^{\circ} 11' N.$ long. $137^{\circ} 40' E.$; its South point is in lat. $54^{\circ} 56' N.$ To the South of it are some small islands. To the East of it are two islands, one in lat. $55^{\circ} 2' N.$, long. $138^{\circ} 22'$, is called *Prokofieff*, the other, in lat. $54^{\circ} 43' N.$, long. $138^{\circ} 12'$, *Koassoff*. At the distance of 6 miles to the West of the Shantar Islands is *Feklistoff Island*. It is 20 miles in extent, from N.W. to S.W.; its breadth being about one half. This island has also no port nor shelter.

Tugurak Bay and River are to the southward of the Shantar Islands. They were partially examined, in 1806, by an officer of the Russian navy, *Borissoff*.

From the mouth of the River Ouda, before described, the coast, for an extent of 50 miles, runs nearly in an East direction to a point behind which is a small bay named the *Bay of Swans*. The western point of this bay is *Cape Dougandsha*, and from this cape to the mouth of the River *Tugur*, the coast runs South; it forms, with a promontory lying 25 miles more to the

lat. $56^{\circ} 25' 50''$, long. $136^{\circ} 26' 50'' E.$; the other West of this is distant about 5 miles. Ayan was formerly a post of the Russian-American Company, but owing to the competition of the numerous whalers, who all traded with the natives, it had given up all business on the coast before the transfer of their interest to the United States.

South than Cape Dougandsha, the *Bay of Tugursk*, the opening of which is 12 miles, and the depth, as above, 25 miles. This promontory is called *Cape Linekinskoy*, and is in lat. $54^{\circ} 14'$, long. $137^{\circ} 24'$. The River Tugur falls into the head of the bay in lat. $53^{\circ} 40'$. The coast between this and *Cape Khabaroff*, in lat. $53^{\circ} 40'$, long. $141^{\circ} 22'$, is but unknown.

ISLAND OF SAGHALIN.

The name applied to this great island is derived from the Mantchous, who thus call it after their great river, Saghalin Ula, the Amour, which falls into the sea opposite the N.W. coast of this island. Besides the term Saghalin, geographers have given it the names of *Oku-Jesso*, of *Krafto* or *Karasta*, of *Tschoka*, and of *Sandan*. It is called *Tarakai* by the natives.

The natives would appear to be very few in number, as scarcely any signs whatever were seen on all the eastern side by Captain Krusenstern, who closely examined this coast, and from the second volume of whose voyage the subsequent particulars are chiefly gleaned. They were principally found in the service of the Japanese in Aniwa Bay. They are called Ainos, as are natives of the adjacent Island of Jesso, and are certainly the same people that, since Spanberg's time, have been called Hairy Kuriles. The Ainos are rather below the middle stature; of a dark, nearly black, complexion, with a thick bushy beard, and black, rough, straight hair; except in the beard, they resemble the Kamchadales. The women are ugly, but modest in the highest degree. Their characteristic quality is goodness of heart, as is expressed in their countenance. Their dress consists chiefly of the skins of seals and dogs, of which latter they keep great abundance. They appeared to live in the most happy way in their domestic life. Their numbers must be very inconsiderable, as only about 300 were seen in Aniwa Bay, and very few elsewhere; it may be presumed that there are none inland, as their food is chiefly fish.

Captain Krusenstern is inclined to doubt the ancient accounts of its inhabitants.

The *Island of Saghalin* extends in a North and South direction about 170 leagues. Its breadth, in general, does not exceed 25 leagues; but in its northern part it is not more than 3 leagues. The southern part, as well as the northern, terminates in a bay. The Dutch gave the name of Aniwa Bay to the southernmost. Captain Krusenstern called the other North Bay.

The island is mountainous; two ranges extend respectively N.W. and N.E. from its southern extremes, and meet in Bernizet Peak in $47^{\circ} 33' N$. Its western face is steep, the eastern low and sandy. The middle district of the island is flat and swampy, but to the North hilly and fertile. It is

well wooded throughout, and large quantities of timber are exported to Japan for building purposes.

There is *coal* in several parts of this island, and on its West side around Jonquiére Bay it rises to the surface, and is of fair quality. Whales are found on the East and West coasts, salmon and herrings abound, and in the deep bay of Aniwa on the South, into which two large streams fall, the Japanese have established an extensive salmon fishery. Water is abundant at all parts, and drift wood for fuel is found in large quantities along the western coast. The northern portion of the island is inhabited by Ghiliaks, and the southern by Ainos, aborigines of Yezo, a race of small stature.

CAPE ELIZABETH is the North point of the island; it is in lat. $54^{\circ} 24' 30''$ N., and long. $142^{\circ} 47'$ E., and is a high mass of rock, forming the extremity of a continuous chain of mountains. It is very remarkable from a number of high pointed hills, or rather naked rocks, upon which neither tree nor verdure is visible. It descends gradually towards the sea, and at the brink of the precipice is a pinnacle or small peak. Seen from the West, it is exceedingly like Cape Lopatka, except that it is higher.

Cape Maria is in lat. $54^{\circ} 17' 30''$, long. $142^{\circ} 17' 45''$ E. It is lower than Cape Elizabeth, and consists of a chain of hills all nearly of the same elevation. It slopes gently down to the sea, and terminates in a steep precipice, from whence a dangerous reef runs to the N.E.

North Bay (*Sévernaia Guba*), lies between these two capes, which lie N. 65° E. and S. 65° W., 18 miles from each other. The bay lies very open, but appeared to be safe, especially in summer, when North winds are rare.

Nadiejeda Bay (or Nadeshda Bay), to the S.E. of Cape Maria, on the West coast, is rather open, and consequently not safe for anchorage, as the ground everywhere is rocky. It lies in lat. $54^{\circ} 10' 15''$ N., long. $142^{\circ} 27' 34''$ E. A plentiful supply of wood and water may easily be procured here. The southern point of the bay was named *Cape Horner*, after Dr. Horner, the naturalist, on board the *Nadiejeda*.

The N.W. coast of Saghalin is infinitely preferable to the S.W.; between the mountains, which are entirely overgrown with the thickest forests, are valleys which appear very capable of cultivation. The shores are broken, almost everywhere of a yellow colour, which gives the coast the appearance of being hemmed in by an artificial wall. The confines of the high and low lands are precisely in the same parallel as on the opposite side; and beyond the limits, to the S.S.W., as far as the eye could reach, nothing could be seen but the low sandy shore, with here and there a few insulated but picturesque sand-hills.

Cape Golovatcheff, in lat. $55^{\circ} 30' 15''$ N., long. $141^{\circ} 55'$ E., forms with Cape

Romberg, on the coast of Tartara, the entrance into the Gulf of Amur, before mentioned.

Having before alluded to the Amur River and this part of the coast, we return again to the North point, and proceed to describe the eastern coast of the peninsula.

CAPE LÖWENSTERN is in lat. $54^{\circ} 3' 15''$ N., and $143^{\circ} 12' 30''$ E. It was named after Krusenstern's third lieutenant. The appearance of the coast between this cape and Cape Elizabeth is very dreary: no traces of vegetation are apparent, and the whole coast is iron-bound, consisting of one mass of black granite rock, with here and there a white spot; the depth at 3 miles off shore was 30 fathoms, rocky bottom. In front of Cape Löwenstern there is a large rock.

Southward of it the shore is everywhere steep, and in several places consists of rocks of a chalk-like appearance.

Cape Klokatcheff is in lat. $53^{\circ} 46'$, long. $143^{\circ} 7'$ E., and near it appeared to be the mouth of a considerable river, as the land appeared to be unconnected. *Cape Wurst* is in lat. $52^{\circ} 57' 30''$, long. $143^{\circ} 17' 30''$. A long way inland there are several considerable high lands, the coast being, as far as the eye can reach, composed of flat sand. *Shoal Point*, or *Cape Otmeloi*, in lat. $52^{\circ} 32' 30''$, long. $143^{\circ} 14' 30''$, may easily be known by a hill of tolerable height, which on this flat coast almost merits the name of a mountain, and forms a very remarkable object. At this point the coast recedes to the westward, and here a *dangerous shoal* lies. It is in lat. $52^{\circ} 30'$ N., and stretches probably for some miles North and South at a distance of 10 miles from the shore. This is the only one met with off the coast, and has $4\frac{1}{2}$ to 8 fathoms on its outer edge.

Downs Point is in lat. $51^{\circ} 53'$ N., long. $144^{\circ} 13' 30''$ E. It is remarkable for a round hill. To the northward of it is a chain of five hills, of a billowy form, having the appearance of islands in this extended plain. The whole coast here, like that to the southward, is scarcely raised above the water's edge.

Cape Delisle, named after the astronomer Delisle de la Croyère, is in lat. $51^{\circ} 0' 30''$, long. $143^{\circ} 43'$, and forms the boundary of the mountainous part of Shaghalin, for to the northward of it there is neither high land nor a single mountain, the shore everywhere consisting of sand, of a most dangerous uniformity.

Cape Ratmanoff is in lat. $50^{\circ} 48'$ N., long. $143^{\circ} 53' 15''$ W. It terminates in a flat neck of land, stretching a considerable distance into the sea. The coast hereabouts is invariably craggy, and of a yellow colour. *Cape Rimnik* is in lat. $50^{\circ} 12' 30''$, long. $144^{\circ} 5'$ E. At the back of it, some miles inland, is *Mount Tiara*, so named by Krusenstern from its form, a tolerably high flat hill, remarkable for having three points on its summit. It is in lat.

50° 3' N., long. 216° 23' W. From its parallel the coast trends South 30° East.

Cape Bellingshausen is in lat. 49° 35' N., long. 144° 25' 45" E. Seven miles S.S.W. of it is a point which was thought to offer a good harbour. The shore is very abrupt and entirely white. *Flat Bay*, in lat. 49° 5', is surrounded on all sides by a country very low. It is a deep opening, in which even from the masthead no land could be described.

Cape Patience is the most prominent and the easternmost cape of Saghalin. It is in lat. 48° 52' N., and long. 144° 46' 15" E., and is a very low promontory, formed by a double hill, terminating abruptly. From this a flat tongue of land projects pretty far to the South. The flat hill near Flat Bay is the first high land in that direction. By this hill Cape Patience, which, owing to its little elevation, is not easily perceived, may soon be recognised.

PATIENCE BAY is extensive, and limited to the East by the cape of the same name, and to the West by Cape Soimonoff. Cape Patience is surrounded by a rocky shoal, extending a considerable distance.

Robben Island, surrounded by a very dangerous reef, lies off Cape Patience. Capt. Krusenstern saw and examined the extent of this reef. The N.E. front he places in lat. 48° 36', and long. 144° 33', and that part which may be considered as the S.W. extremity is in lat. 48° 28', and long. 144° 10' E., so that its whole circumference is about 35 miles. The middle of Robben Island is in lat. 48° 32' 15", and long. 144° 23'. The channel between the cape and the reef was not examined. The ship *Castricom*, under the Dutch commander De Vries, anchored here in 1643, and gave the names to the bay, &c. In the N.E. corner of the bay is the mouth of a tolerably larger river, named the *Neva*. Its entrance, in lat. 49° 14' 40", and long. 216° 58', is about half a mile wide. Off its mouth the water was fresher, and branches of trees were among the clayey soundings. A smaller river debouches to the southward.

Cape Soimonoff, in lat. 48° 53' 20", and long. 143° 2', is the western limit of Patience Bay; it is a high promontory, projecting very much to the eastward. *Cape Dalrymple*, named after the English hydrographer, is in lat. 48° 21' N., and long. 142° 50'. It is formed by a high mountain, lying close upon the beach in a North and South direction, and is the more easily known from being altogether isolated. The coast trends S. by W., consisting of lofty mountains, divided by deep valleys, the shore being steep and rocky. The whole country is more agreeable in prospect than further South. *Cape Muloffsky*, a projecting point of land, is in lat. 47° 57' 45", and long. 142° 44'. *Bernizet Peak* of La Pérouse is probably the same as *Mount Spanberg* of the Dutch. It is a lofty, rounded mountain, in lat. 47° 33', and long. 142° 20'.

Cape Seniavine is a high point of land, in lat. 47° 16' 30", and long.

142° 59' 30". To the northward of it the coast is low, and falls suddenly off to the westward; to the southward are lofty mountains.

Mordwinoff Bay lies to the southward of this, and is limited to the East by Cape Tonin. Plenty of water was found in it in many places, and abundance of firewood. *Cape Tonin* is in lat. 46° 50', long. 143° 33'. It is of moderate height, and entirely overgrown with fir trees. A chain of rocks stretches to the northward from it.

Cape Lowenorn is in lat. 46° 23' 10", long. 143° 40'. It is a steep projecting rock, easily to be distinguished from the rest of this coast by its yellow colour. North of it the coast assumes rather a westerly direction, and consists of a chain of large lofty mountains.

CAPE ANIWA, or *Siretoko* the S.E. projection of Saghalin, is in every respect a remarkable promontory, the more so from a chain of high mountains near it, stretching away to the northward, between which and the cape is a hollow that gives it the appearance of a saddle. The headland itself is a steep, abrupt mass of rocks, perfectly barren, and having a deep inlet at its point. The position was very carefully observed by Captain Krusenstern; it is in lat. 46° 2' 20" N., long. 143° 30' 20" E.

ANIWA BAY occupies the southern end of Saghalin. Its opening is between Cape Aniwa on the East and Cape Crillon on the West, 64 miles apart; its head is at Salmon Bay, 50 miles within the line of opening.

From Cape Aniwa it runs first in a northerly direction, then inclining a little to the West to a headland, which projects also to the West, and from this, as far as the head of the bay, it runs North and South. In this part of the coast is a rock called the *Pyramid* on the charts.

Tamary Aniwa is apparently the name given by the Dutch to the projecting point on the East side of the bay above alluded to. Here was a Japanese establishment, perhaps more considerable than that at Salmon Cove. The harbour is somewhat sheltered against the South wind, but too small for a ship of considerable size to be there. There were about one hundred dwellings of the Ainos.

Lacheforellen or Salmon-Trout Bay is entirely exposed to the South, which are here said to be the prevailing winds, and consequently the road is by no means safe. The great surf is also an obstacle to landing. *Tamary Aniwa* is its S.E. point. The Japanese had here also a large establishment. *Salmon Bay* is at the head of Aniwa Bay. Krusenstern's anchorage off it was in lat. 46° 41' 15", and long. 142° 32'. The Japanese factory, at the mouth of the small river, bore N. 49° W. 2½ miles.

The West side of Aniwa Bay is throughout very mountainous. A flat and rather projecting mountain, in the direction of the coast, which trends S.S.W., is alone distinguished for its greater height.

CAPE CRILLON or *Notoro* is the S.W. limit of Aniwa Bay, and the South extremity of Saghalin. It is in lat. 45° 54' 15" N., long. 141° 57' 56".

North Pacific.

At a short distance from it is a small round rock, and another small rock is at its extremity.

La Dangereuse Rock lies off it. This, with the cape, were thus named by La Pérouse. The rock is correctly termed; it is about 20 feet high, and 60 feet in diameter. It should not be approached nearer than a mile, as rocky ledges extend around it, and is $8\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. from Cape Crillon, and is in lat. $45^{\circ} 47' 15''$, and long. $142^{\circ} 8' 45''$. It lies in the middle of the strait of La Pérouse, which separates Saghalin from the Island of Yezo.

LA PÉROUSE STRAIT.

This strait is formed between Cape Crillon or Notoro, the southern end of Saghalin, and Cape Soya, the North extreme of Yezo. The general soundings in it are 35 to 40 fathoms and upwards, decreasing to 25 and 20 fathoms as the shores are neared; but as these latter depths will be found in the middle of the strait near the Dangerous Rock and in other places, the lead in thick weather cannot always be trusted to ensure safety.

There are heavy overfalls, giving the appearance of a reef, between Cape Crillon and Dangerous Rock, but deep water was found on passing through. Neither this cape nor Cape Nossyab should be closed by a sailing vessel, without a commanding breeze, on account of the tide race off them.

Refunsiri Island, lying off the South side of the western entrance to La Pérouse Strait, is in shape an acute-angled triangle, 11 miles long, and $3\frac{1}{4}$ miles wide at the base which is its North end, where there is a shallow bay, with rather a populous village. The summit of a range of hills, the highest part of which is nearly in the centre of the island, attains an elevation of 1,300 ft., but it is so close to *Pic-de-Langle* on *Risiri* as to appear to the eye much lower.

The shores of this island appear to be clear of outlying dangers, except the North end, where the ground is foul. Nearly 2 miles North of the N.E. point of the island, and about East $2\frac{1}{4}$ miles from *Bomasiri*, an islet 1 mile northward of the N.W. point of the island, is the dangerous rock discovered by H.M.S. *Bittern* in 1855, but it nearly always breaks.

Risiri Island is about 7 miles S.E. of *Refunsiri*, and the passage between is quite clear of all known danger, and may safely be taken. This island, from its great height, becomes, for vessels approaching from the southward, a conspicuous mark for the West entrance of La Pérouse Strait. It is nearly circular in shape, with a generally low shore rising abruptly from the sea. No dangers of any importance are known in its vicinity; a few detached rocks exist, but they lie close inshore. It was first seen by La Pérouse, who took it for a mountain on the mainland of Yezo, and named it *Pic-de-Langle*. Its summit attains an elevation of 5,900 feet, and may be seen in clear weather from a distance of 70 or 80 miles. It is generally capped with snow, and often peers out most usefully above the harassing fogs.

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A bluff point, called *Nakko Head*, jutting out on the north-east side of the island, forms a small bay, which affords shelter from S.E. round to W.N.W.

Totomosiri, or *Monneron Island*, lying N.W. by W. ½ W. 32 miles from Cape Notoro, is of moderate height, without the volcanic appearance of Rifunsiri or of Risiri. There are three rocks awash lying about a mile off its eastern shore, and another about a mile off its N.E. point. There is a spring on Totomosiri, from which whalers are in the habit of watering, but with great difficulty and labour.

CAPE NOSSYAB, the N.W. point of Yezo Island, is the abrupt but rather sloping termination of a remarkable table land, and appears like an island at a distance. Extending a mile northward from the cape is a flat narrow tongue of land, only a few feet above the sea, having upon it a few huts and a fishing station. From the extreme point of this low land a shoal rocky spit, partly covered with weed, extends N.N.W. upwards of a mile, with but little water over it in places, and at its extremity a depth of 2½ fathoms, which rapidly deepens to 6 and 7 fathoms.

CAPE SOYA, the North extreme of Yezo, may easily be recognized, sometimes even in a fog, by a remarkable white rock lying off it to the westward, and which appears to be surrounded with broken ground.

Romanzov Bay.—Between Capes Nossyab and Soya is an extensive bay, in which the land, covered with rank verdure, slopes towards the sea margin. Several huts are distributed along the shores of the bay; and about 5 miles S.W. from Cape Soya is a large Japanese village or fishing station. A vessel intending to take shelter here should be careful to keep 3 or 4 miles off shore.

H.M.S. *Acteon*, in September, 1859, while engaged in surveying the islands Risiri and Rifunsiri, was blown by a W.S.W. gale through the strait of La Pérouse. The atmosphere was so laden with spray as to render it impossible to fix the position of the ship accurately.

Vessels bound through the strait from the eastward with an adverse wind, would do well to stand across and work to windward in Aniwa Bay, where they would have smooth water, no current, and perhaps find an eddy in their favour. At present no dangers are known in this bay.

Cape Crillon, the S.W. point of Saghalin, above alluded to, from a distance of 10 or 12 miles makes like an island. On its summit, 124 feet high, is a small shrine, and 4 miles North of the cape is a conspicuous hill (*Quoin Hill*), which rises abruptly from the shore to an elevation of 1,025 feet. A range of hills, varying from 800 to 1,200 feet in height, amongst which is one of sugar-loaf form, stretches along the coast to the N.E. of Quoin Hill.

The *Tsisia Rock*, 72 feet, conspicuously marks the position of the point of the same name, at 8½ miles N.E. by N. of the summit of Cape Notoro. From the Tsisia Rock the coast trends about N. by E. for some considerable dis-

tance. Anchorage may be taken in 8 or 12 fathoms anywhere along the coast between Cape Notoro and the Taisia Rock.

On the western side, and 3 miles northward of the cape, and near a Japanese fishing-station, is an extensive patch of dangerous rocks, covered at high water; they lie about a mile off shore.

The island of Yezo will be described hereafter.

In and about La Pérouse Strait the tides and currents are very irregular, and they are probably much influenced by prevailing winds. They are felt mostly inshore, particularly round Capes Crillon and Nosyab, where at times they become perfect races. It is high water near these capes, full and change, between 10^h and 11^h, and the rise is about 6 feet.

GULF OF TARTARY.

The entrance of the Gulf of Tartary, which insulates Saghalin, is 170 miles wide between Cape Crillon and Cape Disappointment on the Tartary coast. The western coast of Saghalin trends irregularly to the northward for 370 miles.

From Cape Disappointment, in lat. 45° 40½' N., the coast of Manchuria trends to the N.E., and forms, with the W. coast of Saghalin Island, the long channel named the Gulf of Tartary, which communicates with the Gulf of Amúr to the northward by Tartary Strait. This strait may be considered to begin on the parallel of about 51° N.; on the parallel of Castries bay the coasts of Manchuria and Saghalin converge rapidly; and abreast Cape Catherine, in 51° 57' N., they are only 7 miles apart; 17 miles further North, between Capes Lazaref and Pogobi, they approach to within 3½ miles; and this is the gorge of the strait, and the entrance into the Gulf of Amúr.

The only ports at present known in the gulf are Barracouta Harbour and Castries Bay on its western coast, and Jonquiére Bay on its eastern. The anchorage along the eastern coast is safe during the summer months, when easterly winds prevail; but a vessel must be prepared to weigh, should the wind veer to the West.

The navigation of the gulf would be simple enough, but the fogs render it dangerous, requiring the greatest caution to be observed. It has been remarked by former voyagers, and this was confirmed in 1855-56, that on nearing the land in these seas a vessel will suddenly emerge from the fog or find it lift.

Wood and water can be procured in abundance and with facility, on all parts of the coast of the gulf, and coal, of fair quality, in any quantity at Jonquiére Bay. Fish and wild fowl are plentiful. Very fine codfish have been caught in soundings from 73 to 30 fathoms.

Winds.—During May, June, and July, the winds in this gulf prevailed

from the southward and eastward, sometimes blowing a double and even treble-reefed topsail breeze. Occasionally in May a furious south-easterly gale and snow storm, lasting ten or twelve hours, have been experienced, and they may be expected with a previously freshening breeze from East and S.E., and sometimes a rapidly falling barometer. The wind in these storms rises suddenly, and falls equally so, and will most probably veer to South, S.W., West, and perhaps N.W.

In the end of August and during October the winds were chiefly from S.W. to N.W. and North; they are probably the same in September.

In October foul weather appears to come on as the wind draws to the eastward of North, but by all accounts the heaviest gales may be expected from N.W., and these prevail through the winter.

Fogs.—From March till August fogs are almost continuous in the gulf, with scarcely any clear interval for more than a day or two at a time; they are most prevalent and dense in June, and are immediately dispersed in S.W. winds; the mercury is little affected by them.

In August, September, and part of October, fair clear weather comes in agreeable contrast, although in the latter month snow occasionally falls. The change of weather about the middle of October is sudden, winter generally usurping the warmth of summer in a day, and setting in with all its vigour; at this period ice begins to form in Tartary Strait, and the season for sailing vessels to be in the gulf on ordinary occasions must be considered as having terminated.

Suffrein Bay, formed by Cape Suffrein to the South, in lat. $47^{\circ} 20' N.$, is but an exposed anchorage, surrounded by vast forests which extend out of sight. The cape is fronted by rocks, which stretch half a mile into the offing. *Fish River*, in $47^{\circ} 55' N.$, has anchorage off its entrance in 9 fathoms, at about a mile from the land, sheltered from N.W. and westerly winds.

Low Cape, in $48^{\circ} 28' N.$, has high land behind it, and a depth of 8 fathoms was obtained a mile off shore.

From Low Cape the coast-line northward is irregular for 15 miles; its trend is then N. by E. 20 miles to Beachy Head. It is steep-to, the lead giving 14 to 17 fathoms at 2 miles off shore.

HADSHI or Barracouta Bay.—The entrance to this bay (named also *Port Impérial*), in lat. $49^{\circ} 2' N.$, is between *Freeman Point* on the North, and *Tullo Island* on the South, which bear N. by W. and S. by E. from each other, distant three-quarters of a mile. The general depths in the bay are 5 to 15 fathoms over a mud bottom. The entrance is open to the eastward, but within the bay are several inlets, which afford shelter for all classes of vessels. The only danger is the *Carr Bank*, with $1\frac{1}{2}$ and 2 fathoms on it, which extends a cable off shore on the N.W. side of the entrance, one-third the distance between Sybille Head and Freeman Point.

This bay remains frozen for about the same time as Castris Bay. Its

shores are covered with wood fit for building purposes, such as the larch, fir, and stone-pine.*

Vessels approaching this harbour in foggy weather should not shoal their water under 40 or 35 fathoms, unless well assured of their position, and in all cases due allowance must be made for currents. They are sometimes extremely variable.

In Hadshi Bay it is high water, full and change, at 10^h 0^m, and the rise is 3 to 4 feet.

The **COAST** from Beachy Head trends in a northerly direction to Castries Bay, and is steep-to; 25 and 30 fathoms have been obtained at a cable's length off *Cape Byki* or *Lesseps*, in lat. 49° 33' N. The coast assumes a bolder aspect in proceeding northwards.

Cape Destitution, in 49° 46' N., is bold, high land, having a bay on its North side, which affords good shelter from S.E. to S.W., in 9 or 10 fathoms. Inland it is closed by a shelving beach, on which are scattered some Tartar huts.—(Mr. Tronson.) *Cape Dent*, in 50° 0' N., declines to the eastward, and has a bay on its North side.

CASTRIES BAY was re-examined by Captain Forsyth in H.M.S. *Hornet* in 1855. It is used by vessels to procure a pilot, or to discharge their cargoes, when bound to the Amúr, as those above 12 feet draught cannot enter that river. Its entrance is 4 miles wide between *Kloster-camp* or *Quoin Point*, on the South, and *Castries Point* on the North. Quoin Point is in lat. 51° 28' North. Although the greater part of the bay is open to easterly winds, which throw in a heavy sea, yet vessels, if their draught will permit, will find shelter behind the islands in it, particularly at its head on the West side of Observatory Island. The bay is covered with ice from the middle of November or December to April. The isthmus which separates it from the principal branch of the Amúr is not more than 40 miles across, and Lake Kyzi is only 15 miles distant. At the head of the bay is the Russian settlement *Alexandrofsky*, composed of five or six wooden houses.†

Danger Rock (marked by poles), upon which the sea occasionally breaks heavily, but which does not show in smooth water, lies in the middle of the entrance, with the western part of the promontory (the East extreme of which is Quoin Point) in line with the bluff headland beyond, bearing about South.

* This bay was discovered by H.M.S. *Barracouta*, May 12th, 1856. The Russian settlement is in an inlet on the western side of the harbour, the entrance of which is 1½ mile within the outer points. Here, at the head of a small bay, was found the burnt remains of the Russian frigate *Pallas*, which escaped our cruisers in 1854-5. The settlement is built on a rising ground cleared of wood, and supplied with water from two artificial wells.

† The port in Castries Bay had recently been taken possession of by the Russians when the fleet was here in 1855. The road from the port to the Amur River is comparatively good, and on it are established posts.

In making the bay from the southward two small high and barren islets will be seen near the coast, about 16 miles southward of Quoin Point. In entering the bay and passing southward of Danger Rock, the reef, which extends a considerable distance from the North end of Oyster Island, must be guarded against, but that channel is in other respects clear.

Light.—A *fixed* white light, visible from seaward and in the bay when bearing from N.E. $\frac{1}{4}$ E. (round by the North) to S.E. $\frac{1}{4}$ S., is shown from a square wooden tower, 38 feet high, painted white, with a grey lantern, on Quoin Point, the South point of entrance to Castries Bay. It is elevated 250 feet above the sea, and visible in clear weather at 18 miles.

It is high water, full and change, in Castries Bay, at 10^h 30^m, and the rise is about 6 feet.

NAJASSEE, on the West coast of Saghalin, opposite Cape Lesseps, is an open bay, frequented for its *coal mines*. It was visited by Lloyd's agent at Alexandrovsky in Castries Bay, in 1867. He says: The coal mines at Najassee are in about lat. 49° 35' to 49° 40'. I found that vessels can lie and load there, without particular danger, in open roadstead. The coast runs N. and S.; Cape Najassee, about 5 miles South of Najassee River, stands out only less than 1 mile; the loading place is to the North of the river. Depth of water, about one mile from shore, 13 to 16 feet, deepening to 8 and 9 fathoms 3 to 4 miles from shore. Weather mostly calm during summer; winds, from April to September, mostly moderate, from N.E. to S.S.E.; later, the winds turn over S. to W. and cause the swell to set towards Saghalin. During the spring fogs on this side of the gulf; the Saghalin coast remains nearly always and entirely clear.

JONQUIERE BAY, on the West coast of Saghalin Island, about 1½ mile N.E. of Cape Otsisi, is in lat. 50° 54' N., and may be recognized by three remarkable detached pinnacle rocks, about 50 feet high, off its South point. This bay should be looked upon only as a fine weather anchorage. It affords shelter from N.E. (round by the East) to South, but is exposed to all other winds, and the holding ground is mostly bad. A small river finds an outlet in the bay, and boats can pass over its bar when the tide is in.

Coal.—A few huts of the natives will be seen on the South part of the above river entrance, and between these and Pinnacle Point are seams of good surface coal, some of which, being close to the water's edge, can be easily worked.

Supplies.—Large quantities of fish were taken in Jonquière Bay by hauling the seine on the beach to the northward of the huts, and good sized flat fish were caught with hook and line about a quarter of a mile off shore, in 3 or 4 fathoms water. Wild fowl and white hares are numerous.

The watering-place is inconvenient. Drift wood is plentiful.

TIDES.—The time of high water,* full and change, in Jonquièr Bay, is at 10^h, and the rise is about 6 feet.

GULF AND RIVER AMUR.

The **GULF of AMUR**, or Saghalin, is 70 miles long, North and South, and 25 miles at its greatest breadth. The waters of the river Amúr, which empty themselves into this vast basin with great rapidity, have formed banks of sand and mud, which cover almost its whole surface, barely leaving the shallow channels by which the stream flows on one side to the Sea of Okhotsk and on the other to the Strait of Tartary; this renders the entrance of this great river difficult, and at times dangerous.

Immediately North of Cape Lazaref, at the South entrance of the gulf, the channel from the Strait of Tartary divides into two branches. That which goes to the N.N.W., narrow and slightly winding, is called the South Fairway, and keeps close to the Tartary shore. It has a tortuous course to Nikolaevsk, which is 65 miles from Cape Lazaref. The channel varies from three-quarters of a mile to 2 miles in width; the depths are generally small, but occasionally are as much as 14 and 19 fathoms. The least water is 2½ fathoms, and a flat with this depth extends for nearly 10 miles between Capes Koisakoi and Prongé, and this may be considered the real bar of the river, and must be crossed to enter it. Beyond this bar the water deepens, and 11 fathoms are found abreast the town of Nikolaevsk, above which the river is said to be navigable for 1,500 miles.

The N.N.E. branch, or Saghalin Fairway, is wider and deeper than the other, the least depth being 18 feet at low water. It keeps along the Saghalin shore, at about 5 miles distant, for nearly 60 miles, until just North of Cape Halezof, where it almost touches the coast; and 20 miles further North, between Capes Golovachef and Menshikof, 16 miles apart, it opens out into the Sea of Okhotsk.

The **RIVER AMUR**, or Saghalin Ula, is formed of the streams Shilka and Argun, which unite in lat. 53° 30' N. on the frontiers of Russia and China. The former of these consist of the Ingoda and Onon; the latter being the main stream which rises S.E. of Lake Baikal, in the mountain chain called Khing-khan Ula by the Chinese, and Yablonoi Krebit by the Russians.*

The river flows East as far as Nertchinsk. Here it is said to be 600 yards wide, and very deep; then North, then again East, when it receives the

* The work by the late Thos. W. Atkinson, Esq., F.R.G.S., entitled "Travels in the Regions of the Upper and Lower Amoor," London, 1860, is, with his previous work, "Oriental and Western Siberia," 1858, a most interesting account of this accomplished artist's long residence and journeys in these previously almost unknown regions.

Argun, which comes from the South near Baksanova. The united streams, under the name of Amúr, continue to the East and S.E., receiving from the South the affluents Sungari and Usúri, and reaching its southern limit in 47° 48' N., at the *Mariensk Post* or *Kísi*, one of the most important Russian stations on the Amúr. A battery has been constructed that commands both the entrance to the port and the river. It is from this post that the overland route to Castries Bay (page 582) starts. It would be a most important line for a railway. From Mariensk the river turns abruptly to the N.E. and East, falling into the Gulf of Amúr between Capes Prongé and Tebakh, which are 8 miles apart, and both are fortified. The length of the Amúr, including all its windings, is about 2,500 miles; it is navigable for large vessels as far as Nertchinsk, 1,500 miles from its mouth, in the summer season; in the winter it is frozen over.

Nikolaevsk.—The fortress of Nikolaevsk is built on the left bank of the river, at 22 miles from the entrance. It is surrounded by a few houses, and defended by batteries and strong advanced works. The channels leading from the gulf to the anchorage abreast it are frequently changing, owing to the great débris sent down by the strong current of the river, and with the constant fogs, frequent squalls, and gales, render the approach both difficult and dangerous.

Nicolaiefski or Nikolaevsk is a town of very modern growth. "It is," says Mr. Knox, who visited it in 1866 for the Telegraph Expedition, "emphatically a government town, three-fourths of the inhabitants being directly or indirectly in the service of the Emperor." It has a 'port' or naval establishment, containing dock-yards, machine shops, foundries, and all the odds and ends of sheds, warehouses, and factories necessary to the formation of a naval station. All the houses in the town are of wood, the great majority are of logs, either rough or hewn. Going back from the river the streets begin grandly, and promise a great deal that they do not perform. For one or two squares they are all good, the third square is full of stumps, and when you reach the fifth and sixth, there is little street to be found." *

There are now a large number of steamers on the Amoor. The season when the river is open is limited to about half the year.

Supplies and assistance in the way of repairs are difficult to be obtained at Nikolaevsk. Provisions even cannot be had. Timber is plentiful, and the forests extend as far as the eye can reach, but the export of wood is strictly forbidden.

Light.—A square wooden tower, 29 feet high, painted white, with grey lantern, is erected on the western part of the battery, at the East end of Constantine Island, in the Amur, abreast Nikolaevsk. It exhibits at 40 feet

* Harper's Magazine, New York, Aug. 1868.

above high water a fixed white lens light of the sixth order, visible in clear weather at 7 miles.

A vessel entering the Gulf of Amur from the Strait of Tartary should proceed with great caution, with a boat sounding on each bow, and an anchor ready at a moment's notice. At different intervals great changes have been announced in the channels.

In 1860 the South Fairway Channel was buoyed, and conspicuous wooden beacons were erected on the land to guide through the different bends. The beacon buoys which carry flags may be passed on either side.

Merchant vessels have often remained aground in it for weeks together, and frequently throw a portion of their cargoes overboard to lighten. No permanent directions can be found useful.

At Cape Lazaref the tide flowed twice in the twenty-four hours; the rise was 5 feet, and the ebb ran $3\frac{1}{2}$ to 4 knots. Abreast of Chomé Island the rise was 4 feet, and the water remained at its highest level about fifty minutes. From Cape Djaoré to Cape Prongé there appeared to be no regularity in the tidal action, it being greatly influenced by the winds. It was high water only once in twenty-four hours, and the tide rose 1 foot with a southerly and 3 feet with a northerly wind.

During the few days H.M. ships were off the northern entrance of the Gulf of Amur in 1855-56, the greatest rise of tide observed was 5 ft. The current from the Amur set to the N.N.E. over the banks sometimes 3 knots per hour.

THE COAST OF MANCHURIA.

The coast of what is now Russian Tartary was but little known till the imperial power in China began to decline. When internal rebellion, and external influence were brought to bear on that enormous empire, the countries which surrounded it, and over which it may be said that its sway was but limited, became of even less importance, and thus the Manchurian territories were the more easily ceded to Russia, when the Amur and the adjacent countries were settled and commerce opened. The Russian boundary has been made to gradually encroach on the Chinese regions, and is now established at the Tuman River.*

In the following brief remarks, extracted from the China Pilot, we commence with the southern point, at the Korean boundary. The coast has been surveyed at different times, and hence there is some confusion of names, but they are given in the order adopted in the China Pilot.

* A detailed account of these Russian acquisitions is given by Dr. W. G. Blackie, F.R.G.S., in the Journal of the British Association, 1868.

The first names here given are those of the Russian authorities of 1850, but it may be again stated that the others are given by previous surveyors. The French corvette *Capricieuse* examined Posiette Bay and the anchorages at its head in 1852. It was still further examined by the Russian frigate *Pallas* in 1854, and it was here that her survey terminated. In 1855 a survey was made of D'Anville Gulf, and the gulfs of Guérin and Napoleon, by F. H. May, Master of H.M.S. *Winchester*, and D. H. Wilder, Master of H.M.S. *Nankin*.

POSIETTE BAY, or **D'Anville Gulf**, is comprised between *Sisuro Point* to the South, and *Cape Gamova* or *Hugon* to the North, about 33 miles apart. This latter cape, rising 1,800 feet above the sea, is the end of a peninsula extending to the South. It is visible 30 miles off, and, coming from the N.E., is a good land-mark for this bay, as Cape Casey is from the South.

The land at the bottom of the bay is low and marshy. At the head of the bay are the anchorages, named *Pallada Road* (*Capricieuse Bay*), *Novogorod Harbour* (*Port Louis*), and *Expedition Bay* (*Napoleon Road*).

Farugelma Island (*Cassini Island*), lying in the S.W. part of Posiette Bay, is 3 miles in circumference and 413 feet high. It forms a good mark for entering the bay. There are two villages on its West face. A reef of rocks extends more than half a mile from its S.W. point, and another reef projects from its N.W. point. At half and two-thirds of a mile N.N.E. $\frac{1}{4}$ E. and E. by N. $\frac{3}{4}$ N. respectively from its north-eastern point lie the *Pilier* and *Buoy Rocks*; the latter rock hardly shows at high water.

Moule Bay is partly sheltered to the S.E. by Farugelma Island, and to the N.E. by *Bodisko Peninsula*, the summit of which, named *Mount Direction*, is 820 feet high. The bay is $1\frac{1}{2}$ mile deep, North and South, and 1 mile wide at entrance, which is narrowed by a reef of rocks, awash, stretching nearly 2 cables off the West shore. With the wind from S.E. to S.S.E. a heavy swell sets in. The highest tides observed rose about $3\frac{1}{2}$ feet.

Pallada Road, comprised between Mount Direction to the South, and Klaproth Point to the North, is 5 miles deep N.W. and S.E., with a mean width of 3 miles. It affords fair anchorage within Balbi and Malte Brun points, the inner points of the bay, in from 12 to 5 fathoms, over mud bottom.

Expedition Bay is a good and secure harbour, and affords a safe retreat for vessels not wishing to ride out a south-easterly gale in Pallada Road. The entrance to it is nearly half a mile wide, but it is divided into two channels by a large bare rock named the *Mingan*. The eastern of these channels should on no account be taken. The other channel on the West side of the Mingan must be entered with caution, for it is narrow, and a shoal extends nearly half-way across from the Musoir, so that it is advisable rather to close the Mingan. Entering the bay, take care to avoid a small knoll of $3\frac{1}{2}$ fathoms, nearly in the centre of the fairway.

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The observation spot on the Musoir Rock was found by the *Winchester* to be in lat. $42^{\circ} 37' 22''$ N., long. $130^{\circ} 44' 10''$. By the Russian chart it is in lat. $42^{\circ} 37' 50''$ N., long. $130^{\circ} 50' 50''$ E.

It is high water, full and change, at the entrance to Expedition Bay, at $2^h 30^m$, and the rise is about $2\frac{1}{2}$ feet.

Novogorod Harbour, or Port Louis.—After passing through the channel between the Musoir and Mingan rocks, Novogorod Harbour will open out to the eastward. There are no dangers after the harbour is open. Anchorage may be taken anywhere in mid-channel.

A hard sandy spit runs across the upper part of the harbour. The harbour abounds with fish. There are several small runs of good water; there are also various beds of oysters, and one of large mussels. The hills are covered with long grass, and abound with pheasants, partridges, and foxes; and the low ground, which is swampy, with woodcock and snipe.

AMUR BAY or Guerin Gulf.—H.M.S. *Winchester* left Expedition Bay Sept. 3rd, 1855, and rounding Gamova Point passed between it and the *Korsakov* or *Pelées Islands*; from thence she proceeded to the N.E. into Amur Bay (Guerin Gulf), 40 miles in extent, in which there are several good anchorages. The only danger seen was a rock awash, lying about N.W. $\frac{1}{4}$ W. three-quarters of a mile from the northernmost of the three small islets West of the *Korsakov Islands*.

White Cliff Bay.—Passing between Red Cliff Island and the main, a bay, named White Cliff, was observed, which apparently affords good shelter. The South point, with rocks off it, should not be approached too near.

Slavianski Bay, or Port Bruce.—The *Winchester* passed eastward of the two islands fronting White Cliff Bay, near the northernmost of which there is a remarkable rock called the *Ninepin*. About 3 miles northward of these islands is a conspicuous clifly point, which forms the S.E. point of a secure and deep bight, named *Slavianski Bay*, which forms an excellent harbour, and is well protected by the Eugénie archipelago. Fish and potatoes were procured from the natives, and they appear to be amply provided with those necessaries.

Pestchanoi or Sandy Point.—When abreast Slavianski Bay a high table hill will be seen to the north-eastward, with a tuft of trees on its summit, called *Mount Virginie*, and another further in the same direction named *Mount Winchester*, the eastern slope of which terminates in a low sandy point, in lat. $43^{\circ} 9'$ N., long. $131^{\circ} 50'$ E. The anchorage, N. by E. of this point, is good and quite land-locked.

The *Sui-sun* or *Shilo River*, at the head of Amur Bay, is apparently of some extent, and good water can be procured about a mile from the entrance.

USOURI BAY or **Napoleon Gulf** is an extensive inlet, but nothing could be seen of the least indication of a good harbour. The bay is about 30 miles deep and about 16 broad.

The **Eastern Bosphorus**, between the South end of *Muravief Armursky Promontory* (Albert peninsula), and the islands forming the Eugénie Archipelago, is 6 miles long, and about half a mile broad in its narrowest part. At its western entrance is a sand spit stretching half-way across the passage. When past the spit there is no danger.

Golden Horn Bay, or *Port May*, on the northern side of the Eastern Bosphorus, is an excellent harbour.

EUGENIE ARCHIPELAGO is the chain of islands extending in a S.W. direction from Albert peninsula. There are some good harbours in it, named *Novik Bay* (*Port Deans Dundas*), *Voevoda Bay* (*Port Stewart*), and *Boyarín Bay* (*Wilder Bay*), affording shelter for ships of the largest draught, and no doubt good water can be procured at these.

AMERICA or **Hornet Bay** is formed at the eastern extreme of Peter the Great Bay, and Captain C. C. Forsyth, who discovered it in H.M.S. *Hornet*, in July 1856, describes it as a spacious inlet, carrying a moderate depth up to its head, but open to southerly winds. There is snug anchorage on its western side, between the mainland and an islet, named Fox Island. A river flows round the foot of a peculiar conical hill at the head of the bay; it was named *Lyons River*, after Lord Lyons. Many villages and several herds of cattle were seen.

The **COAST** between America Bay and Islet Point was surveyed by the Russian schooner *Vostok*, in 1861, but we have no description of it. From Islet Point to St. Vladimir Bay was surveyed by H.M. ships *Actæon* and *Dove* in 1859.

Between *Islet Point*, a fine bold rocky headland, and St. Vladimir Bay, the coast is remarkably clear of treacherous dangers, a fortunate circumstance where the navigator is so frequently enveloped in dense fogs.

As a general rule, along the coast of Manchuria, every valley which terminates on the sea-beach has its stream of excellent water. *Drift-wood* is generally found on the beaches.

Siau Wuhu Bay.—The first anchorage to the north-eastward of Islet Point is a small but well sheltered one in Siau Wuhu Bay. From the southward a hill 2,720 feet high, the most elevated in the immediate neighbourhood, is a good mark to point out its position; it bears N.W. by N. $4\frac{1}{2}$ miles from Harbour Island which partly shelters the anchorage. Vessels requiring a refit would find the Inner harbour admirably adapted for the purpose. Approaching the bay from the north-eastward, *Cape Creasy*, a bold rocky headland, the summit of which is 695 feet high, conspicuously marks the East side of entrance.

An extensive plain on the North side of the outer anchorage affords pasturage for a large drove of cattle (August 1859), the property of an old Chinaman who lives a mile or two up the river. He readily parted with some for dollars; they were small, but the beef excellent.

Water may be obtained at a stream which empties itself into the N.E. corner of the outer bay.

Ta-wu-hu Bay, situated 24 miles N.E. by E. of Cape Creasy, is quite exposed to the southward and eastward, and can only be recommended as a temporary anchorage for steamers. There is a village in the bay, but no supplies could be obtained. *Castle Point*, N.E. by E. $\frac{1}{2}$ E. 14 miles of Ta-wu-hu, is a remarkably fine-looking bluff, its yellow cliffs rising almost precipitously from the beach to an elevation of 1,060 feet.

Broken Head is a fine rocky promontory $5\frac{1}{2}$ miles N.E. of *Castle Point*, and the termination of a range of hills, to the rear and northward of which is spread an extensive and well-watered plain covered with rank vegetation, but void of trees. Off the S.E. face of **Broken Head** is a high rock, like a shark's fin.

From 8 to 9 miles N.E. of **Broken Head** are a line of conspicuous white cliffs on the sea face of a wooded range, and 2 miles farther a good-sized open bay, with anchorage in 5 to 8 fathoms.

Mosquito River entrance is $2\frac{1}{2}$ miles North of **Broken Head**. Inside the entrance is a small basin of 3 to 5 fathoms water, quite sheltered from all winds. The bar at entrance has 13 feet on it (1859), but probably winter frosts alter the depths.

Low Table Point, at 20 miles N.E. by E. of **Broken Head**, is a low flat cape, bordered with a vertical cliff, extending 2 miles to the eastward from the base of a conspicuous round-topped mountain about 1,200 feet above the sea. It is especially useful in making *Olga Bay* from the southward, before **Table Point** is risen.

OLGA BAY, or **Point Michael Seymour**, in lat. $43^{\circ} 46' N.$, was discovered by H.M.S. *Hornet*, July 1856. It is open to the southward. There is shelter for a few vessels from all winds in its northern part, in 10 fathoms. The narrow passage, named *Brown Channel*, at its N.E. part, leads into an inner harbour or estuary, which is well adapted for careening purposes. *Brown Channel* has 3 to 4 fathoms water in it, deepening to 6 and 7 fathoms towards the careening harbour. The Russian settlement is here.

Gilbert River empties itself into the N.W. angle of the port. The mouth is broad and shallow, but soon deepens when over the bar.

Supplies.—The seine will always procure an abundance of capital fish, such as salmon and trout. A few fowls may also be procured, and a small supply of fresh beef. The watering stream runs through a valley on the

eastern side of the port, near the ordinary anchorage. Wood may be obtained in any quantity.

In Olga Bay it is high water, full and change, at 5^h 30^m, and the rise is about 3 feet.

The position of Olga Bay may be easily known when approaching it from the northward by *Brydone Island*, on the eastern side of entrance, and the only one on this part of the coast. Coming from the southward, the entrance will be recognized by the opening in the land. *Brydone Island* is not distinguishable at any great distance, as, being only 325 feet high, it looks like a cliff of the high hill, 1,341 feet high, behind it.

ST. VLADIMIR BAY, in lat. 43° 54' N., was discovered by the Russian frigate *America*, in 1857. Its entrance, 1½ miles wide, and open to the East, is formed between *North Head* or *Cape Ballouzek*, 347 feet high, to the North, and *South Head* or *Cape Watauski*, 712 feet high, to the South, both of which, when approaching the bay from the East or N.E., appear like islands. From thence the bay extends westward, and forms three arms, one to the North, one to the South, and the other, the smallest, to the West. The depths are about 15 to 5 fathoms in the North and South arms.

The South arm is well sheltered, but, as a slight swell is frequently experienced there, it can scarcely be recommended as a fit place for careening, especially with Olga Bay in such close proximity, where there is a Russian settlement and every facility for repairs. To the South it communicates with a stream with a lake of 16 to 10 feet water, which with little trouble might be formed into a graving dock.

There is no fixed population in this bay. A few bullocks were seen, but their owners would not part with them for anything but sycee silver, refusing dollars.

The tides are irregular in St. Vladimir Bay. It is high water, full and change, at 1^h, and the range is about 2 feet.

The **COAST** from St. Vladimir Bay trends in a N.E. by N. direction to *Barracouta Harbour*, in 49° 2' N., then N. by E. to *Castries Bay*, and is free from apparent danger. Its outline was but imperfectly known until 1855, when H.M. ships *Sybilie* and *Barracouta* sailed along it, and determined the following points and anchorages.

Shelter Bay, in 44° 28' N., affords shelter from N.E. winds. Good fresh water can be obtained in a river a cable wide, with a bar at its mouth, within which there is a depth of 9 feet. It affords a supply of fish.*

Sybilie Bay, in 44° 44' N., affords shelter from S.S.E. winds; its entrance is remarkable from having on either side some prominent pinnacled rocks,

* This coast is described in Mr. Tronson's Voyage of the *Barracouta*, 1859, p 326, &c.

high and isolated. The bay is closed by a broad valley, through which some streams run and form a small river, which empties itself into the bay.

Pique Bay, in lat. $44^{\circ} 46' N.$, has good shelter from N.E. and easterly winds. The best anchorage is in 5 fathoms, with the point bearing S.E. by E. Cattle may be obtained at this anchorage.

Bullock Bay, in $45^{\circ} 2' N.$, affords but bad anchorage. Bullocks and fowls can be procured, but with difficulty.

Luke Point, in $45^{\circ} 19\frac{1}{2}' N.$, is high, bluff, and woody. *Cape Disappointment*, in $45^{\circ} 40\frac{1}{2}' N.$, has rocks extending a cable from it.

The Gulf of Tartary, which commences at *Cape Disappointment*, is described previously, pages 580—584.

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CHAPTER XI.

THE JAPANESE ARCHIPELAGO.

THE celebrated and long mysterious traveller, Marco Polo, was the first to announce to the western world the existence of the rich and powerful island of *Xipangu*, now known to be Japan. In 1542 a Portuguese, *Mendes Pinto*, was cast by a storm on its shores, and a Portuguese settlement from Malacca was soon afterwards made on *Kiusiu*. In June, 1588, some citizens of Rotterdam fitted out a small fleet of five ships to trade in the Indian Archipelago, and injure, as much as possible, the commerce and power of Spain. Among several Englishmen in this fleet, were *William Adams*, of *Gillingham*, near *Rochester*, and *Timothy Shotter*, who had accompanied the famous *Cavendish* in his circumnavigation. The venture was pre-eminently unfortunate. Only one ship, and that the smallest, the *Joyous Message*, commanded by *Siebold de Weert*, returned to Holland. Two of the others were destroyed, and the fourth, in which were these two Englishmen, reached Japan a mere wreck. They were taken prisoners; and, after some confinement, *Adams* was taken into the confidence of the emperor; the rest departed. He was raised to great honours; became of first importance in the political and commercial affairs of the empire; but did not succeed to the extent of his intentions, having gained privileges only for the Dutch, who have studiously avoided mention of his part in their establishment. Some extensive privileges were also granted, at his instigation, to the English East India Company, to establish a factory at *Firando*.*

As is well known, the only port allowed to be open to foreigners, and this permission was limited to the Dutch and Chinese, was the Port of *Nagasaki*, or rather for the Dutch, the Island of *Dezima*, lying before it. But the

* The first English who visited it were with *Capt. Saris*, who came to the relief of *Adams* from England, in 1611, arriving at *Firando* June 9th, 1613.

North Pacific.

Japanese maintained a rigid exclusiveness, and but little was known to Europe about the country. Without enumerating the older authors, the principal work on Japan was the collection from the notices of the Dutch presidents, by Dr. Ph. Fr. van Siebold, who visited the country in the period between 1823-30, a magnificent work, worthy of any nation.

The events of later years have marvellously altered the relations between Japan and western civilization. The various attempts at obtaining some admission into Japanese affairs, made prior to 1853, cannot here be enumerated. But in that year, July 8th, Commodore Perry, U.S.N., appeared off the entrance to Yedo Bay, with two large steam frigates and two sloops of war. He ostensibly sought at first only to abolish the barbarous Japanese laws, which consigned shipwrecked seamen to death, and their vessels to destruction. The steady resistance to any intercourse, overawed, however, by the presence of this formidable force, gradually gave way, and some concessions were granted before the departure of the fleet, which left with a promise, or menace, from Commodore Perry, that he intended to return for a more definite answer with a "larger fleet" in the following year. Accordingly, on February 12th, 1854, a squadron of nine war vessels appeared in the Bay of Yedo, and after skilful negotiation a treaty of friendship was concluded between the Tycoon and the United States, and permission was granted to locate a consul at Simoda, an insignificant place at the South extreme of the Idsu Peninsula, on the West side of Yedo Bay.

The second stage of this international negotiation was reached by Mr. Harris, the U.S. diplomat, who, by unremitting zeal, contrived to enter Yedo at the end of 1857, not to leave it till April, 1858, with the treaty of commerce framed. This great step was followed by similar concessions being granted to the principal European powers; and that with great Britain was ratified at Yedo, July 11th, 1859. After all these apparent victories, it was discovered that these treaties were illegal, having been made with the Tycoon of the period, whereas it should have been ratified by the Mikado, but this was remedied by the appearance of the allied fleet from China and the subsequent full recognition of the rights of the external world to trade at various ports. Of the subsequent troubles nothing can be said here. The works of Sir Rutherford Alcock, Captain Sherard Osborn, R.N., &c., &c., will supply all that can be required.

Climate.—The following observations upon this subject, connected with Japan, are made by Van Siebold:—"In speaking of ice, frost, and snow, within 32° of the equator, we should consider the geographic position of the Japanese Islands, and cite an observation which has been more than once made, and at last confirmed by Alex. de Humboldt. The eastern part of Europe, and the immense continent of Asia, are vastly more cold, under the same latitude, than western Europe, making allowance for the greater or less elevation above the sea level. The climate of islands being much milder

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subject, connected with of ice, frost, and snow, geographic position of the as been more than once ldt. The eastern part of astly more cold, under the ance for the greater or less lands being much milder

than that of continents, it can scarcely be comprehended that the temperature should be lower in Japan than those European countries under the same latitude. But the cause of this contradiction is found in the low temperature of Asia, which, surrounding the Japanese and Kurile Islands on the West and North, has a very decided influence on their climate. From the proximity of the continent, and the winds blowing off that coast during a portion of the year, the cold arises which prevails in Japan, particularly in the North and N.W. Thus in lat. 32° N. the thermometer descends on the coast to 30° and 29° Fahr. It freezes to several lines in thickness, and snow falls that remains on the ground for several days. In lat. 36° the lakes, as those of Suwa on the Sinano, are covered with a bed of ice, which, between 38° and 40° , becomes thick enough for the river to be crossed on foot. In the island of Tsusima (lat. $34^{\circ} 12'$ N., long. $126^{\circ} 55'$ E.) rice will not grow; near Matsmae, in the Island of Yedo, wheat returns but a very poor harvest; and on Cape Soja (lat. $45^{\circ} 21'$ N., long. $140^{\circ} 29'$ E.) the wild Ainos, a vigorous race, are obliged to retire into caverns, to preserve themselves from the intolerable rigour of winter. On the other hand, the S.E. and eastern sides, protected from the freezing winds of Asia by high chains of mountains, which traverse these great Islands of Kiusiu, Sikok, and Nipon, in a direction parallel to the continent, have a more fertile and more temperate climate. In those parts of the country between lat. 31° and 34° , the palm, the banana, myrtle, and other plants of the torrid zone, are found. In some parts the sugar-cane is successfully cultivated, and they gather two rice harvests each year. The environs of Sendai, a city in lat. $38^{\circ} 16'$ N., long. $138^{\circ} 36'$ E., near Niegata, produce this grain in such abundance, that, notwithstanding their northern position, they are in reality, as they are called, the granaries of Yedo, the most populous city of the country. But it is more particularly in the rigorous season, which lasts from the commencement of January to the end of February, that this difference between the western and eastern shores of Japan becomes most remarkable. At Dewima (Nagasaki), for example, in lat. $32^{\circ} 45'$ N., long. $127^{\circ} 31'$ E., the thermometer marks 45° Fahr.; while at Yedo, in lat. $35^{\circ} 41'$, long. $137^{\circ} 22'$ E., it rises to 56° ; so that the position of the capital, more easterly by $9^{\circ} 51'$ than the factory, raises its temperature higher by 11° , although it is only 3° nearer the pole. Thus in the two months of winter in which these observations were made, the coasts facing the Asiatic continent were exposed for thirty-seven days consecutively to the freezing winds from N.W. and North. This circumstance explains, besides, why the white mountain (*Siro-jama*), which is on the western coast of Nipon, in lat. 36° , is covered with perpetual snow at 8,200 feet above the sea; and why *Fusi-jama*, at the eastern extremity of the island, with its summit at 12,450 feet, remains without snow for months together.

"During the hot weather in July and August, when the winds blow from South and S.E., this disproportion in the temperature disappears, and the

mean height of the thermometer for this season is 79° at Dezima, and 76° at Yedo. On the South and S.E. coasts, then refreshed by these winds, it hardly exceeds 85° ; nevertheless in the South and S.W. parts of Kiusiu, and chiefly in the bays sheltered from the breezes, it often rises to 90° and 98° , and sometimes even to 100° ."

The empire of Japan is composed of four large islands, Kiusiu, Sikok, Nipon,* and Yezo, and numerous smaller islands. Nipon, the largest and most important of these, and that which gives its name to the whole empire, is more than 700 miles in length N.E. and S.W., and its breadth varies from 50 to 150 miles. South of Nipon, and separated from it by a narrow channel, is Kiusiu. Lying N.E. of Kiusiu, and eastward of the South extreme of Nipon, is the island of Sikok, about 130 miles in length. It is separated from Kiusiu by the Boungo channel, and with Kiusiu and the western part of Nipon forms a basin or inland sea named Seto Uchi. North of Nipon, and separated from it by the Strait of Tsugar, is the large island of Yezo, a conquest and colony of Japan. Its form is that of an irregular triangle.

At Hakodadi, the climate in winter is variable. In the winter of 1859—60, the greatest depression of the thermometer was 12° . The character of the winter season is uneven, and acts prejudicially on the health, in consequence of the great variability of the atmosphere, thaws and sharp frosts alternating. North-westerly winds blow for four months, and snow fell in the winter of 1859 daily for six weeks. Sir R. Alcock says the winter is almost Siberian, with long continued and heavy falls of snow, the thermometer standing many degrees below zero.

Fogs are very prevalent on the coasts of Japan, especially in the northern parts, and thunderstorms are frequent. In June and July, they occur frequently in the Korea Strait; further to the North they envelope the coasts of Manchuria till the middle of July.

Earthquakes.—The whole region of the Japanese Islands is volcanic, and many of the eruptions are fraught with extreme danger to ships. At Yedo, one occurred in August, 1783, exceeding in its horrors and wide spread desolation that of Lisbon. Another occurred at Yedo on the 10th Nov. 1855, which is said to have caused the destruction of 100,000 dwellings and 54 temples, and the death of 30,000 persons.

In 1854 the town of Simoda was reduced to ruins, and the Russian frigate

* *Nipon* is applied in Japan to the whole empire. In the two words of the Chinese characters which compose it, *Jih Pun*, it means the place or rising of the sun. The Japanese soften the first letter into n, and so make it *Ni Pun*, the Dutch spelling it *Jeh Pun*, their *j* corresponding with our *y*. The English, giving the harsher sound to j, call it Japan; so *Jeddo* should be pronounced *Yedo* for the same reason, and is hereafter spelt so.

Diana nearly wrecked in the harbour, being whirled many times round her anchors, at one time aground, at another in many fathoms depth. She was then greatly injured, and was subsequently lost in an inexplicable submarine tornado, whilst in tow of a multitude of Japanese boats which deserted her suddenly at some, to them, well known warning.

Simabara, in Kiusiu, is also a locality of terrible earthquakes, one of which is said to have altered the whole feature and coast line of the neighbouring province.

The Japanese Current, or Kuro Siwo, as it is called by the Japanese in one point of its course, is an immense stream which rushes past the southern coasts of the Japanese Archipelago towards the N.E., and is exactly analogous to the Gulf Stream in the North Atlantic. It has been observed by every voyager in these regions; and, like the Atlantic Stream, may be traced to a great distance to the eastward, and evidences of this drift have been frequently found on the American coast, as in the remains of junks, or of these vessels with their crews being drifted on to the American territories, as has been previously related.

But the Pacific current differs from the Atlantic Stream in not being confined in a narrow channel at its outset, and in the strongest part of its course. Hence its velocity and direction are not so constant, and some great variations in the current have been experienced, and these, too, without any apparent cause. Thus there can be no dependance placed on its rate or direction, and inshore it is certainly controlled or altered by tidal action. In a later part of this work this remarkable stream will be noticed more at length, in the section specially devoted to currents.

ISLAND OF KIUSIU.

The word Kiusiu, according to Kämpfer, signifies "country of nine," in reference to its division into nine larger provinces. It is 65 leagues in length from N. to S., and 40 leagues in breadth. It is separated from Nipon by the Simonoseki channel, which at its western entrance is only half a mile in width. The strait which separates it from Sikok also is contracted to 10 miles broad at one point. The Strait of Van Diemen forms its southern boundary, and the Strait of Corea, or Kora's on the western side.

The Japanese Archipelago has never been properly surveyed. Some portions have been minutely examined, especially the vicinities of the treaty ports where European commerce has hitherto been allowed. In addition to the surveys made by the officers of the American squadron in 1853-4, and the British fleet in 1863, there are various portions derived from the surveys of Commander J. Ward, R.N., in the *Rifleman*; of Commander Brooker, R.N., in the *Sylvia*; and especially of Commander C. Bullock, R.N., in the *Serpent*.

All these and others have been connected together by a most remarkable map. During the political negotiations this perfect representation of the empire was delivered to our representatives, and it was found to be a regular trigonometrical survey of 6 miles to an inch, and so accurate that, when tested by the surveyors, it was found that very great reliance could be placed on it. Such a geographical work deserves especial mention.*

The ensuing directions are those given in the *China Pilot*; and, though belonging to various authors, have been collected, arranged, and amplified by Commander C. Bullock, R.N. These directions commence with the southern extremity of the Archipelago, which is, although differently arranged to the preceding portion of this work, has been followed here, as it is thought more convenient than proceeding from the northward.

VAN DIEMEN STRAIT separates Kiusiu from a group of volcanic islands, which, extending in a S.S.W. direction, connect this extremity of Japan with the volcanic ranges of the Philippine Islands. They will be described in a future Chapter. These islands, on the South side of this strait, are high, and apparently of safe approach, as is also the South end of Kiusiu on its North side. On the North side is Kagosima Gulf, of which Cape Chichakoff forms the S.E. point of entrance, and a remarkable mountain, named *Horner Peak* by Krusenstern, the N.W. point. This mountain, with a similar mountain on Iwoga sima on the southern side of the strait, both of great height, form two conspicuous land-marks when approaching the strait from the westward. The whole of the above gulf, excepting to the North, is surrounded by high mountains, covered with verdure, which stretch away along the coast to the north-eastward of Cape Chichakoff.

CAPE CHICHAKOFF (*Satano misaki*) the south-western extremity of the Japan Archipelago, is the western and somewhat low extremity of very high land, which has no remarkable feature. It is about 500 feet high, and has three remarkable rocks lying close off it, one of which, bearing West from the extreme of the cape, is of a sugar-loaf shape and perforated at its base. These, with a small island lying South about 2 cables, and another East about a quarter of a mile from the pitch of the cape, will enable the seaman

* There is a sad story in connexion with this map. It is related in Commodore Perry's "Narrative," page 88. The story is thus told by a modern writer on Japan. "Von Siebold had been with Colonel Strurler, the Dezima chief, to Yedo; the Japanese astronomer, *Takahasi Lakusaimon*, had, in violation of the law, furnished him with a copy of a recently made map of Japan. The draughtsman who made the copy having become, from some cause, offended with the astronomer, denounced him to the authorities. An investigation followed, which lasted a year. Von Siebold was banished from Japan; and *Takahasi*, and the draughtsman who accused him, both committed suicide." This occurred prior to the commencement of the American Expedition in 1853.

at all times to recognise this headland with certainty. Soundings, of 8 fathoms, were obtained by H.M.S. *Roebuck*, in 1859, about $2\frac{1}{2}$ miles off the cape, the perforated rock bearing N. $\frac{1}{2}$ E.

There is anchorage with easterly winds on the West side of the cape, with its extreme bearing S.S.W., and perhaps a more sheltered position is in the N.E. corner of the first bay to the northward of the cape.

KAGOSIMA GULF is an arm of the sea 35 miles in length and 5 to 10 in breadth, on the western side of Cape Chichagoff, which runs in a North direction into the southern part of Kiusiu. At 25 miles within its entrance the large island of *Sakura* nearly fills the head of the gulf, with channels on both sides leading into an inner gulf or spacious harbour, 6 miles by 9, and quite landlocked. The western channel was surveyed by the Masters of the fleet under the command of Vice-Admiral Kuper, in August 1862. The extreme depth of the water in the gulf renders anchorage very difficult; the fleet having only found indifferent anchorage close to the beach on the western shore, near the Seven Rocks 4 or 5 miles South of Kagosima.

KAGOSIMA.—Facing the Island of *Sakura* on the West, the Kiusiu shore projects, narrowing the western channel into the inner gulf to 7 cables at its northern part, its length being 4 miles. On this projecting shore stands the city of *Kagosima*, the fortress of the Daimio, Prince of Satsuma.* Battery Point, to the South of the city, is low, and has a spit extending from and around it to 2 cables, and very steep at its edge; a shoal also fills the bay North of this point. Off the centre of Kagosima in front of the Daimio's castle is an inner harbour or large camber, gained by entrances between five forts of masonry, which have deep water close up to them. Two small rivers disembogue, one on the North side of the city with long spits off its points of entrance.

The *Parker Shoal*, lying in the southern part of the western channel, has a large fort erected on it (1869). It forms a good mark, being 25 feet high. The shoal is nearly circular, and about 4 cables in extent, and on its S.W. side is a flat of 3 to 5 fathoms where temporary anchorage may be obtained.

The islands *Oko* and *Karasuka* lie close off the S.W. and W. part of *Sakura*; the latter has small spits off its North and South points; otherwise both are steep-to.

Naku or Yama Kawa.—This small harbour, formed on the West side of entrance of Kagosima Gulf, is the crater of an extinct volcano. Its North part opens East to the sea by a funnel shaped passage, a quarter of a mile in length, but only half a cable wide at its inner part. There are 4 to $4\frac{1}{2}$ fathoms over the lip of the crater, and a shelf off the southern shore at

* The fortress was bombarded on August 16th, 1863.

entrance off the village of Yama kawa. In the southern part of the harbour there is no bottom with 100 fathoms.*

The South Coast of Kiusiu trends to N.E. by E. for 30 miles to the S.W. point of Tasman Bay, open to the S.E., and 12 miles wide. From *Toyimisaki*, its eastern point, the coast of Kiusiu runs for 100 miles to N.N.E. with but few inflexions to the entrance of the Boungo Channel. This coast was partially seen and laid down by Broughton and Krusenstern, but the names they applied to the various points on it, being not recognised on the more recent Japanese chart, cannot be enumerated here. At some future day, when the hydrography is more complete, they may be identified.

The **BOUNGO CHANNEL**, which separates the islands Kiusiu and Sikok, is from 7 to 20 miles broad, and its shores, according to the Japanese chart, are singularly broken into projecting peninsulas. It was passed by Kämpfer and Thunberg, and they speak of the thousands of islands with which it is encumbered. The allied squadron, under Admiral Sir A. L. Kuper, entered it in August and September, 1864, and found it free from danger, and the Japanese charts correct.

Okino Sima, forming the eastern point of the South entrance to this channel, is large, of moderate elevation, and may be seen in clear weather at 35 miles. To the northward of it, also towards Hima sima and towards the main land to the eastward, the space appeared to be rocky foul ground.

Euryalus Rock, named after H.M.S. *Euryalus*, is a small rocky islet, 50 feet high, lying in the middle of the Boungo Channel, 26 miles N.W. of Okino sima. It is surrounded by rocky shoals, some above water, to the distance of half a mile. It occupies a most excellent position for a lighthouse.

Takanaba, the island lying nearly in the middle of the northern entrance of the channel, has two small rocks above water, at 2 cables N.W. of it. There appeared to be a good passage on either side of the island.

Off the south-western part of Sikok, at the entrance of this channel, several reefs and a large island are omitted from the charts, which cannot be specified in a short notice. Caution is therefore requisite.

Nomi, in lat. $33^{\circ} 23' N.$, long. $133^{\circ} 19' E.$, is a secure and spacious harbour affording good anchorage in 11 to 7 fathoms mud. Its entrance is to the westward of an island, *Tosima*. Reefs extend 1 mile off this headland,

* In 1863 the British barque *Nelly* reported having discovered a sunken rock off the S.E. coast of Kiusiu on the western side of entrance to the Boungo Channel. Its position is given as lat. $31^{\circ} 48' N.$, long. $131^{\circ} 42' E.$ The bottom had a white appearance, with soundings of 8 and 5 fathoms close to the rock. But Commander Bullock, R.N., sounded along this coast in 1866, and found from 18 to 39 fathoms near the reported position.

and also the wooded island, *Tuff*, lying South from it; and a flat isolated reef, 4 feet above water, lies S. by W. 2 miles from Taft Island, and S.S.E. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles from the West point of Tosima.

Susaki is also stated to be a fine harbour, but it was not examined.

Ura-No-Utsi lies 9 miles East of Nomi, and is barred across the entrance by a sand-bank. Some shelter may be obtained in S.W. winds, in 4 to 8 fathoms.

Kotsi Inlet, in lat. $33^{\circ} 30' N.$, long. $133^{\circ} 35' E.$, has a narrow and difficult entrance. Vessels of 15 feet draught may enter at springs. The outer anchorage in 7 fathoms sand cannot be recommended.

THE SETO UCHI OR INLAND SEA.

The great Inland Sea of Japan, to which the name of its eastern part has been erroneously given, is called by the Japanese Seto Uchi. It is enclosed between the S.W. coast of Nipon, which entirely bounds it on the North and East; and the Islands of Kiusiu and Sikok, which bound it on the West and South. It extends somewhat in an East and West direction, in length 240 miles, with a breadth varying from 10 to 30 miles. It has six divisions called *nadas* or seas, taking their names generally from the provinces, the coasts of which they wash; thus, the western part of the sea, as far as the Boungo Channel, is called the Suwo *nada*; and proceeding East, we have in succession, Iyo *nada*, Misama *nada*, Bingo *nada*, Harima *nada*, and lastly Isumi *nada*, sometimes called the Gulf of Oô saka.

The Seto Uchi was first navigated by H.M.S. *Cruizer*, in 1859, and it was passed throughout by the allied fleet under Admiral Sir A. L. Kuper, in 1864. It contains upwards of 300 islands and rocks, with but few known dangers, and has a sea-board of nearly 700 miles, on which are situate numerous large towns and several of the provincial capitals. It abounds with safe and convenient anchorages. It communicates with the Pacific by the Kii Channel on the East, and by the Boungo Channel, between Kiusiu and Sikok, on the South; and with the Sea of Japan by the Strait of Simonoseki on the West. There is a great maritime trade along its populous shores, as well as the through traffic to Oô saka, the chief seat of commerce of the empire, and the seaport of its capital, Miako.

The Seto Uchi can be navigated with safety at all seasons of the year, and even under favourable circumstances during the night, the more particularly now that a correct chart of it has been published.

The **WESTERN ENTRANCE** to the Seto Uchi is at its outer part 35 miles across, being formed by the West coast of Nipon running South for 25 miles from Kado sima, and the North coast of Kiusiu taking an easterly direction for the same distance, from Wilson island. At the angle where

these coasts meet within 3 miles, is the large island Hiku sima, South of which is the fairway and entrance to the Strait of Simonoseki.

The passage between *Koko Sima* and Wilson Island is 2 miles broad, 5 to 12 fathoms in depth, and appears clear. Lying 7 cables N.W. of this island is a round islet which may be passed at 2 cables. A spit of gravel and large stones, $1\frac{1}{2}$ mile long, stretches from the S.E. point of Koko, nearly across to the shore of Kiusiu.

A *Shoal Patch* of 15 feet, rock, lies E. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from the North point of Koko sima, with the outer high peak of Kiusiu (1,900 feet), bearing S. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles. Wilson clump kept open of the North point of Koko sima leads clear of it.

Siro Sima.—These two islands, one mile apart, lie W. by N. $\frac{1}{2}$ N. 16 miles from the outer point of Wilson Island. The north-eastern one, 400 feet high, with a wooded summit of rounded outline, has a round rock off its rugged North point, and a shoal spit running 4 cables off its South point. The South island is indented, its eastern sharp peak being 290 feet high; there is shoal water off its South point; its North point is steep-to. A rocky patch of some extent, with less than 2 fathoms on it, lies 1 mile S. by E. of the above sharp peak. Another rocky patch of 2 fathoms water extending half a mile East and West, lies S. by E. 3 miles from the same peak, and W. by N. $\frac{1}{2}$ N. $2\frac{1}{2}$ miles from Iwaya Point.

Iwaya Point, on Kiusiu, with projecting ledges, is 4 miles S.S.W. of South Siro sima, at the termination of a sandy bay 5 miles wide. A wooded hill, 1,100 feet high, conspicuous from the offing, with a round gap in its summit, rises 5 miles S.W. by W. $\frac{1}{2}$ W. of Iwaya Point.

Masui Sima, or *Notch Island*, lies N.E. by N. 6 miles North of Siro sima, and 3 miles from the shore of Nipon, off Cape Morotzu, the hills over which are 1,000 feet high. The channel between is free from known danger.

The northern part of this island is a triple topped bluff, 900 feet high; on the West coast, about the middle of it, there is a very sharp peak.

Ai Sima, or *Flat Island*, bearing S. by E., 6 miles from Masui Sima, is a flat island covered with trees, and 1 mile in length. Reefs, dry or sunken, extend 1 mile off its North point, and a spit runs S.E. by S. $1\frac{1}{2}$ miles from the South point; there are also others extending 8 cables East of its South point, and which are marked by a small square rock. To the S.W. of Ai sima is a large detached reef with a sand patch on it.

Rokuren Island, 3 miles S.E. by E. of Ai sima, has on its table land a large and conspicuous clump of trees, 390 feet above the sea, which is visible after rounding Wilson Island, when it will bear about E. $\frac{1}{2}$ N.

HIKU SIMA, lying at the entrance of Simonoseki Strait, is 3 miles in extent North and South, and has a smooth green hill 380 feet high on its

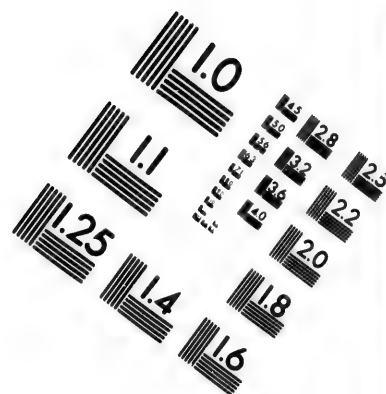
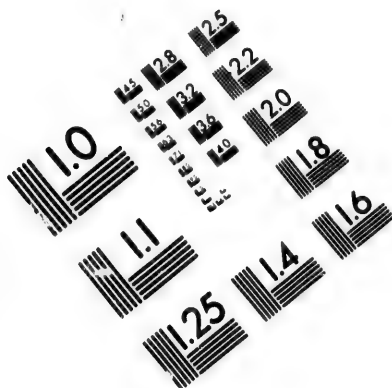
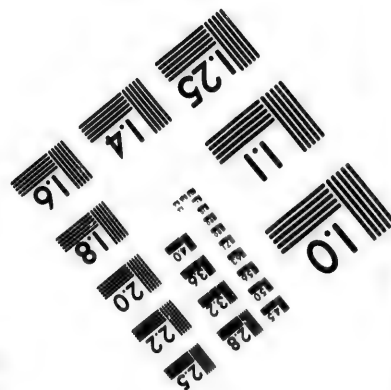
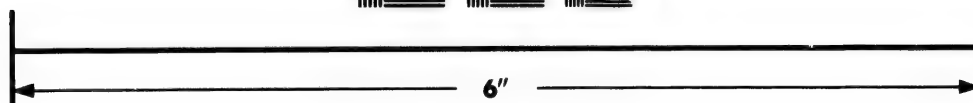
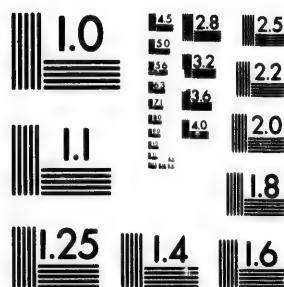


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North point. Its western point, *Cape Sizikuts*, is a low rocky promontory, with an island off it, which from its similar formation appears connected. Its S.W. point, *Entrance Head*, is a wooded bluff 380 feet high.

Light.—A *fixed* white light is shown about two-thirds up the hill on the North point of entrance to Fuku-ura.

There is a small anchorage on the S.E. side of Masui sima. There is anchorage also along the Nipon shore, East of Ai sima and Rokuren, in 7 and 9 fathoms, but the coast should not be approached within half a mile, as it is fringed with reefs; northward of this the reefs extend a mile off shore. If, however, there be sufficient daylight to get round Rokuren, it is recommended to do so instead of anchoring outside for the night. There is also anchorage in *Hamo Bay* on the S.W. side of Hiku.

It is high water, full and change, at the entrance of Simonoseki Strait at 10 p.m., and the rise and fall is scarcely 4 feet.

If bound to Simonoseki from the westward, pass North of Wilson Island, and steer E. by N. $\frac{3}{4}$ N. for the North point of North Siro sima, which pass at half a mile; then steer East, taking care not to bring the North point of North Siro sima to the northward of West, till the centre of Ai sima bears South, so as to clear the reefs off the North point of Ai sima. A S.E. course will then lead up to Rokuren, which can be rounded at 3 cables, when steer S. by W. to pass the West point of Hiku sima.

The southern channel is not recommended.

The **STRAIT OF SIMONOSEKI**, commencing at Entrance Head, the S.W. point of Hiku sima, is 7 miles in length, with a navigable channel varying from 3 to 7 cables in breadth. The town of Simonoseki stands on the Nipon shore 4 miles within the entrance.

Hiku Flat, lying W.N.W. 1 mile of Entrance Head, is a bank of sand stone rock, 8 cables long and 3 broad, with 13 feet water on it.

Kokura Ledge is a flat of sand and rock, with shoal patches on it, fronting the low shore of Kiusiu South of Hiku sima, and where stands the town of Kokura on a small stream called Ogawa. The flat extends from 1 to 2 miles off shore. *Manaita Rocks*, lying nearly 2 cables South of Entrance Head, uncover towards low water. They were marked by a beacon. *Narusi Rock* is a quarter of a mile S.W. of Kibune Point, the S.E. point of Hiku sima, and $1\frac{1}{2}$ cable off shore. It uncovers before half ebb, and was very dangerous, but is marked by a beacon.

Yodasibi Rock lies E.N.E. $4\frac{1}{2}$ cables of Kibune Point, and is best avoided by hugging the Hiku sima shore. It only shows at low tide, but is marked by a small stone post with a rivet-shaped head. This post is only about 2 feet above high water, and cannot be seen at night.

SIMONOSEKI, or *Shimonosaki*, is an important town from its position at the entrance of the Inland Sea. It is formed of a single principal street running for nearly 2 miles at the base of some low steep hills along the shore of

Nipon. Its most conspicuous building is the custom-house, recognized by its tall white gables. A *small light* is exhibited on the shore at the end of a stone balustrade at the eastern end of the town.*

Supplies of provisions and coal were obtained by the squadron with difficulty, as it was not a treaty port. The coal, which is much used here in the forging of nails, was of the worst possible description, and gave 75 per cent. of ash and earthy matter. Water of excellent quality was brought off in buckets in large boats.

Mozi Saki.—The strait is narrowed to 3 cables between this point, which is the extreme of a promontory at the North end of Kiusiu, and the eastern end of the town of Simonoseki. *Whitshed Bay* and the village of Mozi are on the S.W. side of this promontory. The heavy vessels of the allied fleet anchored in it after the capture of Simonoseki, in September, 1864.

The Fisherman Rock, a dangerous reef, lies northward of the Tano Bank. It is 120 yards long, N. by W. and S. by E., has only 4 feet on its southern end, 12 feet on its northern end, and 5 fathoms between at low water springs. There are 6 fathoms close to its South, East, and West sides. From the rock, Mozi saki bears S.W. by W. $\frac{1}{2}$ W.; Isaki, E.S.E.; Kusi saki, N.E. $\frac{3}{4}$ N.; and the South extreme of Manziu Island, N.E. by E. $\frac{1}{2}$ E. The custom-house at Simonoseki in line with Mosi saki, W. by S. $\frac{1}{2}$ S. clears it to the southward.

Tano Bank lies 1 to $1\frac{1}{2}$ miles E. $\frac{1}{2}$ N. from Mosi saki, off Tano-ura village. Anchorage in 5 fathoms may be found on the outer part of this bank. North of it is the *Konabuse Rock*, with two heads.

Isaki is the eastern promontory of the North point of Kiusiu, and South point of East entrance of the strait. It may be passed at 2 cables.

Light.—H.M.S. *Perseus* observed in December, 1865, that a light, a wood fire in an open shed, had been placed on Isaki Point.

Kusi Saki, the North point of entrance of the strait, has reefs extending 2 cables off it. There is a large military station here, named Chofu, or Hagi Chiofu, the fortress of the powerful Daiuio, the Prince of Daisen or Nagato.

Kanzu and *Manziu* are two islands E. by N. of Chofu Point. *Kanzu* is low and flat, with some large rocks and a rock awash off its South end; but *Manziu* is 190 feet high.

Midway between Kusi saki and Isaki, is a large *Middle Ground*, on which the least depth found was $2\frac{3}{4}$ fathoms; but there may be less water.

* In the course of the various troubles which arose out of the jealousy of the native princes, it was determined to attack Simonoseki, which was done by a squadron of 8 vessels, under Admiral A. L. Kuper, on September 6, 1864.

To facilitate the navigation of the Middle Channel, two iron buoys with cages were placed in 1869.

1. A buoy with *black* and *white* rings in 9 fathoms on the Kanabuse or Fisherman's Rocks; from it Mozi Hill bears S.W., Isaki Point E.S.E., Kusi-saki N.E. by N.

2. A *red* buoy in 3 fathoms on the Middle Ground; from it Kusi-saki bears N.N.W. $\frac{1}{2}$ W., Isaki Point S.E. by S. $\frac{1}{4}$ S., and Kanabuse Buoy W. by S.

The deepest water through the channel will be found $1\frac{1}{2}$ cable southward of the buoys.

If intending to anchor off the town of Simonoseki, take a position well below the custom-house (not conspicuous), in 6 to 10 fathoms, out of the tides, which are very rapid through the narrows, with strong eddies along the shore during the western stream.

It is high water, full and change, at Simonoseki, at 8^h 30^m; springs rise 8 feet, neaps 6 feet. The western stream makes at $2\frac{1}{2}$ hours before high water, the eastern stream $2\frac{1}{2}$ hours after high water, so that the western stream continues 5 hours, and the eastern 7 hours.

Off Mozi saki the velocity at springs is 7 to 8 knots, at neaps 3 to 4 knots; the current is at its full strength for 3 hours of each tide. There are heavy overfalls in the eastern part of the strait at springs.

Directions.—Entering the strait: after rounding the West point of Hiku sima, steer S.E. until the leading mark to clear Hiku Flat is brought on; when steer S.S.E. $\frac{1}{4}$ E. easterly. This mark will also clear the Manaita Rocks off Entrance Head. When the summit of Entrance Head bears N.N.E. steer E.S.E. till Mozi Hill, 583 feet, opens of Kibune Point, when haul up, taking care still to open it till Hino yama is also open, so as to clear the Narusi Rock. Pass Kibune Point at a cable, and steer N.N.E. $\frac{1}{4}$ E. for Hino yama, which will lead up to Simonoseki.

After passing Simonoseki, borrow oar towards Mozi saki, after rounding which steer E. by N. $\frac{1}{4}$ N. with the leading mark on to clear the Tano Bank. When the point next East of Tano-ura bears S.E. by S., steer E. by S., altering to S.E. $\frac{1}{4}$ E. as Isaki is approached, which pass at 2 or 3 cables, into the Seto Uchi.

The SUWO NADA, the largest and westernmost division of the Inland Sea, is bounded on the North by the promontory of Suwo, the western extreme of Nipon, and limited to the East by the Island Ya sima. Its length is nearly 60 miles, and it opens into the Pacific by the Boungo Channel.

Iwami sima, in the eastern part of this sea, has a cone-shaped island eastward of it; it may be passed close on the S.W. *Uwa sima*, or *Hekgosidi*, is small, with a cluster of rocks on the S.W.

The ensuing directions for it are somewhat abbreviated from those drawn

up by Captain Charles Bullock, R.N. They can only be used in connection with the chart (Admiralty chart, No. 2875), which is composed from the Japanese Government map before referred to, with subsequent corrections by European officers. The intricate nature of the navigation cannot be verbally described.

Steering through the Suwo nada: From Isaki, the western entrance point, steer S.E. $\frac{1}{2}$ E. 10 miles, or until the promontory of Moto yama bears North. An E. by S. $\frac{1}{4}$ S. course may then be kept for 26 miles, which will lead two miles North of Hime sima, a high island off the N.E. point of Kiusiu. Continuing 22 miles farther on the same course will lead 2 miles South of Ya sima, which may be rounded at a mile.

In passing through the Inland Sea, as it is generally necessary to anchor at night, so it is important that as many convenient anchorages as possible should be indicated along the route. In the Suwo nada are the following—In 5 to 8 fathoms for 10 miles south-eastward of the strait; or about the southern edge of the Motoyama Shoals. In $5\frac{1}{2}$ fathoms, muddy bottom, at *Mitawidi*, in about lat. 34° N., long. $131^{\circ} 33'$ E., with the small conspicuous island, Taba sima (Saba sima?), bearing S.W. $\frac{1}{4}$ W. It has a great trade in salt. On the N.W. side of the Island of Kasato, which is approached from the S.W. passing S.E. of three islets; and also at the port of *Kaminoseki*, opposite the town, which stands on the North of the East point of an island of the same name, a large place of trade. There is anchorage, also, in the small bay on the South side of *Hime sima*, in 5 to 9 fathoms, sheltered from all northerly winds.

IYO NADA.—The next arm of the inland sea lies between the islands against Nipon to the N.W. and the clearer western coast of Sikok, and is about 45 miles in extent. From a mile South of Ya sima steer E. by N. $\frac{1}{4}$ N. 14 miles, and pass half a mile South of *Minasi*; then shape a north-easterly course, passing on either side of Yuri, and through the channel North of *Kosii*.

Kuminasi sima, which is a mile South of *Minasi*, may be passed at a quarter of a mile on the South. *Yuri* (or *Uaro sima*) makes like two islands from the S.W., joined by a sandy beach; it may be passed on the South or on the North at a third of a mile. *Kosii* is also called *Gongo sima*; and *Nokona*, *Nogowino sima*.

MISIMA NADA and BINGO NADA, two divisions of the Inland Sea, are filled with islands, and separated by a narrow strait on the Sikok shore. From *Kosii*, passing South of *Nokona Island*, and West of *Simonanba Point*, a N.E. course will lead up to *Kadzitori Point* and *Cape Iyo*, off both which are rocks. North of *Cape Iyo* is an archipelago 30 miles in extent.

Thence to the eastward two routes are indicated on the chart, namely, a northern route through the archipelago, by a channel circuitous, narrow, and intricate, amongst high islands and with strong currents, and by which

Japanese pilots have invariably conducted foreign vessels; and a *southerly* one, much to be preferred, as shorter (by 6 miles), safer, and more open, passing South of and avoiding the archipelago. A third passage, also through the islands, but only indicated on the chart by soundings, is the shortest, but not good.

The *Ai sima* are two remarkable rocks, the eastern of which is white, the western brown; they have been passed at $1\frac{1}{2}$ mile. The Black and White rock is much larger than *Ai sima*.

Light.—There is a light always at night on the South point of Okamura, $3\frac{1}{2}$ miles N.W. of Cape Iyo, and $1\frac{1}{2}$ mile West of the entrance of the northern passage. Like all Japanese lights, it is a wood fire burnt in an open shed.

Northern Route.—Mr. Blackney, R.N., of H.M.S. *Actæon*, 1861, gives the following: Pass between Kotaka and Kio sima, steering a northerly course along the East shore of Osakiyue Island, and close to the westward of the small island of Matsu; round Okuno to the northward, and keep along the mainland as far as Mihara. From Mihara pass South of Yoko into the Bingo nada, across which steer E. by S.

Approaching the western entrance to this route, it is not easy for a stranger to immediately discover its narrow outlet, the islands rising from 2,000 to 4,000 feet. Keeping the southern shore of the islands aboard, the town of *Mitarai* is passed, and the small island of *Kotaka* (200 feet) may be recognised by the remarkably white rocks which fringe its base. *Koi sima* is 400 feet high, and well cultivated. Steer N.N.E., keeping the East shore of Osakiyue aboard, passing marble quarries, but give its S.E. point a berth. Pass to the West of a conical rock off Osaki and several small islands further to the North. On leaving Tatanomi Bay it is necessary to steer 1 mile S.E. to clear some shoal water on its eastern side. A vessel will then be in the fairway.

Rounding the point of the main, keep its shores somewhat on a N. by E. course, altering it to East off a bay, on which is situate the large town of *Mihara*, which has a *light* on the mole, and passing between its East point of entrance and the beacon on a small bushy island to the South. This beacon (as are the other beacons in this channel) is built on the outer rock of a reef, so that it always appears above water. After passing this beacon, the channel between *In sima* and *Muko sima* will open out, with *Hyakfukung*, a remarkable conical islet, 150 feet high, and 8 miles distant, appearing midway between two barren looking points on either hand. Through this channel, about 4 cables broad, now proceed S.E. $\frac{1}{2}$ E. for 6 miles, passing close to the beacon off the South point of *Muko sima*. There is another beacon off the S.W. point of *Yoko*.

The **Wusima Channel** passes between the islands of Daizo, Hakubo, and

O-sima, having Wu-sima between them. The plan on the chart is the best guide. The tides at springs are so rapid that it is then impossible.

Southern Route.—The superiority of this route is evident, the tortuous passages between islands being only 4 miles in length, whilst that to the northward runs 24 miles amongst islands, and that of Wu-sima 8 miles through them.

Cape Iyo, the N.W. extreme of Sikok, is a long promontory of undulating hills; a grassy island half a mile N.W. of it, and with a low reef which never uncovers, 2 cables outside the island. *Kadzitori Point* is a bluff 200 feet high, with rocks half a cable off. *Ko sima* has a double peak 400 feet high on its North end. It is well cultivated. Rocks stretch off its South point towards the shore. *Ma sima* is 250 feet high; there are rocks awash close off its N.W. end.

O-sima has many hills 600 to 700 feet in height. Off its South point are two islets; the outer one is 20 feet high, with a tree on it. *Hiki sima group* is 100 feet high; the eastern island has two remarkable trees on its summit. *Kudsi* is a double flat-topped island, 200 feet high. *Moto Island* is a double hill 300 feet high, with a gradual slope to the East. *Takaikama*, *Oki*, and *Yeno*, form a conspicuous group. *Takaikama* has a single peak 800 ft. high; *Oki*, three peaks of 540 feet elevation, with a small islet South of it; *Yeno*, one peak, 200 feet high.

Directions.—After rounding Cape Iyo, pass East of *Ko sima* and West of *Ma sima*, on a southerly course; then keep away to the eastward, and giving the islets off O-sima a good berth, haul up W.N.W., passing West 1 mile of *Kudsi*. This course leads through the *Bingo Nada*. Until better examined, when passing between islands in these seas, especially those bearing East and West of each other, great attention should be paid to the lead.

Tomo is a town on the North shore of the *Bingo nada*, on the mainland. It is famous for its *saké* distilleries. There is a pier harbour here for small vessels, and anchorage in 5 fathoms.

A line of islands trends south-eastward across the eastern side of the *Bingo nada* from **Tomo** towards a projecting peninsula, *Akenose Misaki*, on the East side, 12 miles distant. The best route through them is to the southward, between the following islands. To the northward are: *Udsi*, which has two peaks 380 feet high. *Mutsu sima* is 900 feet high, and cultivated to its summit. *Nezumi sima*, a small low, brown island, having shoal water extending a considerable distance to the East, and a cluster of rocks near it. *Takami* is 830 feet high and very bold, and may be passed on the South at a quarter of a mile. The *Conqueror Bank*, so named from H.M.S. *Conqueror*, one of the allied fleet, grounding on it in 1864, extends from near *Takami Island* to within a quarter of a mile of *Nezu sima*. It has some knolls of 9 and 12 feet on it.

The route passes to the northward of *Awa sima*, the North point of which

is steep-to, with 19 fathoms 2 cables off. Off its East point is a detached reef. *Sizi sima* is a beautifully cultivated island; a long shoal lies parallel to, and 7 cables from its North shore.

There is good anchorage in the northern bay of *Awa sima*; also South of *Awa sima* and *Sizi sima* in 6 to 8 fathoms; and anywhere to the N.E. of the latter for 7 or 8 miles, as far as *Sai sima*, in 5 to 7 fathoms, gravel. About 50 tons of coal of inferior quality was found stacked East of the village on the South side of *Awa sima*. H.M.S.S. *Dove* and *Leven* coaled here.

The *St. Vincent Channel*, safe, easy, and deep, passes to the northward of the Conqueror Bank between *Nezumi sima* and *Sayanagi* to the North of it. It cannot be well described without the chart.

Sai sima and *Sei sima* are low, with shallow water between them. Take care not to mistake them for the two dark tree islets off the town of *Murakame* on the South shore. North of *Sai sima* is a cluster of three small rocky islets which may be passed on either side.

Odutsi is a fine cone, 900 feet high, and a very prominent object from all directions.

Oki sima, *O sima*, and *Inaki sima*, are high; at half a mile North of the latter is a dangerous reef. There are shoals between these islands. Great caution should be used in approaching the fine bay of *Takamatsu* from any direction.

HARIMA NADA, the next division of the Inland Sea, lies off the N.E. end of *Sikok*, and is about 25 miles in diameter. It is separated from the easternmost area by *Awadsi Island*, and has some dangerous shoals in its northern part.

Sozu Sima, or *Shode sima*, a large island in the eastern part of the *Harima nada*, is 10 miles long, 8 miles broad, and 2,560 ft. high. On its South side the high promontory of *Yosino*, terminating in a bluff 980 feet high, stretches to the southward, forming a conspicuous land-mark throughout the *Harima nada*, and the narrow sea to the westward. Anchorage probably may be found to the N.W. of *Yosino bluff*. *Sakate Bay*, to the N.E. of *Yosino*, affords anchorage in 16 fathoms, but it is not by any means a good anchorage, the water being so deep. N.W. of *Otsu no saki*, the S.E. point of *Sozu*, in the bay between it and *Fukube Island*, there is deep-water anchorage in 13 to 20 fathoms.

Hanamura Bay, on the *Sikok* shore, S.S.W. 5 miles from *Yosino bluff*, is not a good anchorage in the neighbourhood, and a fine harbour. A large town stands at its head. On the promontory which forms its West side, the high rugged *Peak of Dotensan*, a sacred mountain, is a very conspicuous object.

Great Shoal.—An extensive triangular spit of covered rocks, having the East side of *Sozu sima* for a base, is said to stretch in an E.N.E. direction for 25 miles, to within 10 miles of *Akasi Strait*, and 5 miles of the North end

North Pacific.

of Awadji. A good mark for passing between the banks is the Hiogo range just open of Yesaki, the N.W. point of Awadji.

Skenesi Bank is 7 miles S.W. by W. from the North point of Awadji sima. Not less than 6 fathoms has been found on it, but probably there is less water.

But there is a 1-fathom patch, called *Shika-no-se*, at 8 miles W. $\frac{1}{4}$ N. from the North point of Awadji.

AWADJI or *Awadsi*, the largest island of the Inland Sea, is 30 miles in length North and South, and 14 miles across at its southern or broadest part, which is between the projecting promontories of Nipon and Sikok, at the eastern entrance of this sea from the Kii Channel, which it divides into two passages, the strait of Isumi on the East, and the Naruto Passage on the West. Awadji is mountainous, but the hills taper away towards *Ye saki*, its North cape, which is low and sandy, with batteries on it.

Akasi Strait, between the North point of Awadji and the coast of Nipon, is only 2 miles wide, and commanded by forts on both shores. It is free of danger, and its shores are steep-to, but a 20-foot shoal is said to exist about a mile South of Mieco. The tides here are very rapid.

Lights.—There is a light on the North point of Awadji; and another 2 $\frac{1}{2}$ miles N.N.W. of it, on the Nipon shore, West of Akasi.

The *Hasedasinosse Bank* extends 2 miles off its western shore, 3 miles North of Morotsu, with 3 fathoms on its edge.

Sailing from the Bingo nada into the Harima nada, keep strictly to the track marked on the chart, which is a mid-channel course, as the sea is greatly narrowed here, with many shoals out of the fairway. After rounding the high bluff of Yosino, steer E. $\frac{1}{4}$ N. until Awadji sima is closed within 5 miles, when keep along its shore for *Ye saki*, its North point, into Akasi Strait, from which an E. $\frac{1}{4}$ N. course leads to Hiogo and Oösaka.

Anchorage is found in Yei Bay, 12 miles S.W. of *Ye saki*, in 9 fathoms, one-third of a mile from the shore, and all along towards that point in 7 to 12 fathoms.

Caution.—Should the tide be found setting to the northward after leaving Yosino Bluff, keep its outer summit open of Otsuno saki, the S.E. point of Sozu sima, till well across towards Awadji, to prevent being set on the Great Shoal. To avoid the Skenesi Bank, do not approach *Ye saki* on a N.E. by E. $\frac{1}{4}$ E. bearing.

H.M.S. *Ringdove* took a northerly passage through the Harima nada passing West of Tomo sima, from the North side of which a spit extends 2 miles, which she rounded in 8 fathoms; she passed North of Sozu sima and South of Matsu sima, an E. $\frac{1}{4}$ N. course leading into Akasi Strait.

A sand-spit also extends from the North shore of the Isumi nada, 8 miles West of Hiogo, where a large fishing village is situated. The sound-

ings gradually decrease on approaching it, and a slight attention to the lead, or keeping $1\frac{1}{2}$ mile off shore, is sufficient to lead clear.

The **ISUMI NADA**, or **Gulf of Oosaka**, at the N.E. extreme of the Inland Sea, and 35 miles in extent N.E. and S.W., is bounded to the South by a promontory of Nipon, and to the West by the large mountainous island of Awadji. Its shores are in general high and thickly wooded; in some places, however, they are low and sandy. It is singular in having neither an island nor a danger. On the East shore of Awadji the water is deep, with no convenient anchorages except in small bays close in. The coast of Nipon, on the contrary, affords good anchorage along its whole extent, reefs only extending off it 1 or 2 cables.

OOSAKA.—The city of Oosaka, the principal commercial place in Japan, was opened as a treaty port to foreign commerce Jan. 1st, 1868. It is said to contain a million of inhabitants, and, unlike most Japanese cities, its houses are of two stories. It stands on the left bank of the main stream of the Yodo-ngawa, 3 miles from the sea. This river, which takes its rise in the great inland lake, Biwa, after flowing on a south-westerly course for 30 miles, enters the Gulf of Oosaka by several channels. At the lower or north-western corner of the city the river divides into two branches—the *Ajikawa*, as the Yodo is here called, continuing directly towards the sea; the other branch, the *Kishungawa*, takes a southerly course, and discharges itself 3 miles lower down the gulf. These two branches are navigable by junks of moderate size, but the heavier classes are compelled to discharge their cargoes in the roadstead.

Oosaka is intersected by several canals, which are mostly very shallow, and only navigable by the flat boats of the country. The castle of the Tycoon is on the N.E. of the city, overlooking the river.

The foreign concession named *Ebisu jima* or *Kawa nguchi* occupies the angle formed by the Aji and Kishu branches; its position is indicated by lofty trees. The right of building is confined to this site, but the right of residence extends over the contiguous suburb westward. It is $2\frac{1}{2}$ miles above Temposan, the fort at the river's mouth, and 2 miles below the castle.

The **River Aji** is shallow, but may be navigated by ships' boats as far as the castle; it has a bar, which at unusually low tides would be nearly dry; at exceptionally high tides, 7 feet might be carried over. The channel is marked by large piles, the two outer having triangular vanes to distinguish them; the shallowest part is just outside these outer beacons, and the best passage over is at one-third the distance from the North beacon, so as to avoid a shoal extending south-west from the other. When inside, the deep water is close along the groynes on the South side, which always show. There is generally 3 feet more water in the lower part of the river than on the bar.

Directions from within the Bar.—Keep the S. bank of the river, which will

lead up in a nearly direct course to the Tycoon's Castle (above the first bridge the river is seen to turn off sharp to the South; this is the Kishu branch), keep close past the Concession, but in the same direction, for above this the river has two distinct channels, separated by narrow islands and shallow sand banks, which can seldom be crossed.

Boats may be obtained just above the fort, or at Ichiokashinden on the left bank, $2\frac{1}{2}$ miles higher up.

Light.—The large fort of Temposan, which stands on the South part, commands the entrance of the river; it is a high turfed earthwork, scarped with masonry, and is a conspicuous landmark, the shores being very low. On the parapet of its western salient is a small wooden lighthouse, from which a *fixed* light is exhibited. There are no towers.

Oosaka Roads.—The depths in the roadstead are extremely regular, diminishing gradually over a soft mud bottom; the holding-ground is so good that it is considered a vessel could ride out any gale in safety. The shores are everywhere of clean sand (as are the river bars), but it constitutes a fringe only, mud being found at a cable from the low-water line. The best anchorage is West of the Temposan or Oosaka lighthouse.

Kishu Ngawa River.—Two miles S.S.E. of Oosaka bar is the bar of the Kishu, at the North point of entrance of which river a small star fort is being constructed at low-water mark a mile from the shore. This bar has not been closely examined, but it is probably a little deeper than that of the Aji, as a larger class of junks ascend this branch to Oosaka.

Sakai.—*Light.*—S. by E. 4 miles from Temposan is the mouth of the Sakai River, which enters the sea between two short moles extending from two green batteries; it has no bar, and has 2 feet at entrance. A *light* is exhibited from a wooden turret on the North fort.

HIOGO and Kobe.—This is a *treaty port*, and is 13 miles West of Oosaka. The foreign settlement has been chosen at the head of the northern bay of Kobe (or *Corvi*). This bay is somewhat smaller and shoaler than Hiogo Bay, but the shores of it are steep, and if less sheltered in S.W. winds, it is less exposed to easterly winds.

The Japanese government have two docks at Kobe Point, where vessels of 500 tons, if lightened to 7 or 8 feet draught, can be taken in for repair.

Large timber, chiefly cedar (Su-ngi), is abundant, and suitable for ship-building purposes, spars, &c. The fresh water obtained at Kobe is good; that of Hiogo is indifferent.

Directions.—If entering Hiogo at night from the West, a course may be steered for Hiogo Point, which, though extremely difficult to see if it be all dark, is nevertheless bold; otherwise, pass it at a moderate distance, and when the shipping lights are seen bearing N.N.W. or N.W. steer for them, or if bound to Kobe steer North; in thick or rainy weather, having run the distance with care, haul in for the shore, as convenient, and anchor in 8 to 5

fathoms. It must be borne in mind that the tide runs along the shore nearly 2 knots at springs, and its direction has not been ascertained; near Akasi Strait it is even stronger.

The coast, as far as Tree Point, 7 miles eastward of Kobe, is safe of approach, the shore being steep into 4 fathoms, except the bay directly East of Kobe, where there is a sand-bank of less than 2 fathoms extending half a mile off shore.

Two rocks, which show at low water, lie in the fairway between Akasi Strait and Hiogo, 3 miles E. $\frac{1}{2}$ N. of the North point of Awadji; there are also two sunken rocks on the same bearing, at $1\frac{1}{2}$ mile from the same point, over which are depths of 20 or 26 feet; they have been accurately laid down on a late survey (1867) by Japanese Naval Officers. The North point of Awadji, kept West until the end of the Hiogo range (bordering on the sea) bears N.E., leads well clear of both.

Tides.—It is high water, full and change, at Hiogo, at 7^h 15^m. Springs rise 5 feet 8 inches; neaps, 4 feet 3 inches; neap range, 2 feet 6 inches. The range of any day seldom exceeds 5 feet at springs, or 1 foot 6 inches at neaps.

At Osaka Concession the establishment is 8^h 17^m. Spring rise 30 inches, neaps 6. The flood stream does not reach the Concession.

ISUMI STRAIT, between the S.E. point of Awadji and Nipon, is divided into three channels by the islands Tomang-ai and Diyi. *Tomang-ai*, the eastern island, is wooded, with the exception of its West hill, cleared apparently for military purposes. There is a fort close to the North of the south-western point across a small ravine, and facing the West; *Diyi* is wooded, but lower. The West or main channel is 2 miles wide, but contracted by a sand-bank, which extends half a mile off the large fort of *Yura*, and by reefs stretching 3 cables off the S.W. part of *Tomang-ai*. The centre passage is only 1 cable wide, and full of rocks. The eastern channel, called *Duinozetti*, is a quarter of a mile wide, and said to be clear and safe, between the reefs, which extend $1\frac{1}{2}$ cable off both shore and island.

Yura is a town in a curiously sheltered harbour on the S.E. side of Awadji, on the West side of Isumi Strait. A low island, $1\frac{1}{2}$ mile in length, of sand and shingle, and covered with scrub, with a bluff hill on its North point, and a large granite fort on its South, lies like a breakwater fronting a bay, and forms the harbour, which has narrow entrances North and South. A little North of the fort, where the island is stony, it covers at high water, but a boat can scarcely pass over it. A vessel drawing 16 feet could enter by the North channel at high-water springs, and lie secure in smooth water for repair.

Anchorage may also be obtained in 2 to 5 fathoms outside the island on the sand-bank off it, with the outer extreme of the bluff N.W., or of the

fort S.S.W., but it is very steep on the edge, and the holding-ground is probably not good.

Kata is a town on the eastern side of Isumi Strait, on the South side of a bay North of Takura saki, and where there is anchorage in 5 to 8 fathoms. There is a fine landing-pier here 200 yards in length for the use of the Daimio, who resides at *Wakayama*, and to whom Kata belongs. Off Takura saki, and in Kata Bay as far as Diyi Island, reefs, covering at high water, extend about 3 cables off the shore.

It is high water, full and change, at Yura and at Kata, at 6^h 5^m; springs rise 6½ feet; neaps 4½ feet. At Akasi, on the North side of Akasi Strait, it is high water at 6^h 36^m.

The KII CHANNEL, between Sikok and Nipon, is 80 miles across at its entrance from the Pacific, but the width decreases to 15 miles at 30 or 40 miles within, which width it preserves for 20 miles further, or up to Awadji. The fairway from the Kii Channel into the Seto Uchi is by Isumi Strait, but there is a more direct route, by taking which (if not bound to Oosaka or Hiogo) a saving of 35 miles is effected, viz., the Naruto Passage, West of Awadji.

NARUTO PASSAGE.—The Naruto (literally, gate of the sea, which makes a great roaring) was examined by Commander Charles Bullock, in H.M.S. *Dove* in 1861. It had previously been considered to be a *whirlpool*, and it is not without cause that this dangerous character has been attributed to it, for junks have foundered in its turbulent waves, or been dashed to pieces on its rocks by the impetuosity of the current, whilst the families of those thus lost are excluded from the benefit of the relief afforded by government to the sufferers in ordinary cases of shipwreck. This channel lying between *Koura saki*, the projecting S.W. promontory of Awadji, and that of *Oonge sima*, called *Mang osaki*, is only 6½ cables wide from point to point; and is further narrowed to rather less than 2 cables by an extensive reef of rocks off *Koura saki*, and some reefs and islands off *Mang osaki*. *Mang osaki* and *Koura saki* are low bluffs; *Tobi sima* and *Naka sima* rocky islets covered with trees; *Nakase* is a low rock, which it is said never covers, and off which and *Naka sima* stretch extensive reefs bounding the passage, marked during the strength of the tide by seething breakers, which break in several fathoms. N. by W. and S. by E. are the courses recommended when steering through with the tide, keeping midway between the breakers, or between *Nakase* and *Naka sima*. The current was observed to set out S.S.E. ½ E., a little before change of stream.

Through this narrow passage the tide runs, or rather falls, with a velocity much exceeding 8 knots at springs, changing regularly and suddenly every six hours, there being no slack water. The junks choose the early and latter parts of the tide, when fair, to pass, but never attempt it when the wind is so strong as to require reduced canvas, for then the sea is said to be so

great that vessels are unmanageable; however, there would be no difficulty to steam-vessels taking the passage in fair weather, at any time with a favourable tide, or within an hour of the change of stream before the contrary tide has made strong, as the passage is distinctly marked; but in bad weather it would probably break right across, and the passage not be discernible. The roar of the breakers can be heard several miles on a calm night.

Tides.—It is high water, full and change, at Fukura, on the eastern side of the passage, at 6^h 17^m; springs rise 7 feet, neaps (probably) 4½ feet. The north-western stream makes at 2½ hours before high water at Fukura, changing every six hours nearly. North of the Naruto passage the tides are anomalous.

H.M. surveying vessel *Dove* passed through the Naruto on the second day after the moon's change, and at half tide, which is the period of the maximum velocity of the stream. Several junks passed through the same day on both tides, either with a light fair wind, or drifted through in a calm.

If wishing to wait for slack water or change of stream, anchorage may be found on the Awadji shore, at Ananga ura, on the North side of the Naruto, and at Fukura on the South, in 4 to 8 fathoms. There is also excellent anchorage in Minotoye Bay, 5 miles to the westward.

Sio Saki, the S.W. point of Awadji, has two or three small hills on it about 200 feet high. Reefs extend 2 cables off it, also a 3-fathoms bank 7 cables to the westward.

Noma Sima is formed of some very flat-topped hills from 100 to 200 feet high, bordered with low cliffs. It has reefs a cable off its South point; there is a bay and village on its West side.

Isima lies in the Kii Channel, at its narrowest part, at 25 miles S.S.E. from the Naruto Passage. It is small, and its southern peak is visible 30 miles. It may be approached to within a mile, except on the West. The channel to the West of it is 3 miles broad. Extending right across this channel there appears several detached groups of rocks, some of which are above water; but there are channels through them.

Wadasima Harbour.—On the West coast of the Kii Channel, 14 miles N.W. from Isima, lat. 34° 0' N, is a bay affording excellent anchorage, especially for smaller classes of vessels, in 5 fathoms, sand, completely landlocked; and sufficient shelter for vessels of heavy draught from all dangerous winds in 7 fathoms. Its only known danger is the *Johnston Rock*, which uncovers 2 feet at low water, and lies N. by E. ½ E. 1½ mile from *Wadasima*, the point of entrance.

The channel between Isima and *Kamoda-saki* (the eastern point of Sikok) is 3 miles broad; in it are several detached groups of rocks, reported by Mr. J. Cheetham, of the schooner *Kaffir Chief*, which do not cover at high water, and amongst them (according to the description of the fishermen who acted

as pilots) are sunken rocks, over which not more than 24 feet can be carried in any of the channels, excepting the westernmost, which the fishermen stated to be clear of danger and navigable.

TAKURA SAKI, the eastern point of entrance of Isumi Strait, is a wooded headland, with a small summer-house on its summit, the extremity of a mountainous promontory. It is skirted with reefs extending 2 or 3 cables West and South of it. The coast South of it is low and wooded for 5 miles, as far as *Zoga saki*, a rocky point with four small islands off it which are steep-to.

The eastern coast of the Kii Channel trends irregularly to southward. It was surveyed by Commander Charles Bullock, R.N., in the *Dove*.

Hachken Gawa is a small river running through a plain 5 miles S.E. of Kata. *Waka Yama*, a small isolated wooded hill, is on its left bank $1\frac{1}{2}$ mile from the entrance; on its summit stands the residence of the Prince of Ksiou, conspicuous from the sea. There are only 3 feet water on the bar. There are forts on both sides of the river.

South of *Zoga saki* is a bay 4 miles deep, and 3 across its entrance, in which anchorage may be found in 4 to 10 fathoms.

Osaki Bay is $1\frac{1}{2}$ mile deep, and open to the W.N.W. The village of *Osaki* stands on the shore of a narrow inlet on its North side, where small vessels can find good shelter in 5 to 2 fathoms, which they can also obtain in *Smotz ura*, the innermost bay on the South side of the inlet. The only danger is a rocky patch of one fathom 2 cables S.E. of the North entrance head.

Okino sima, W. by S. $\frac{1}{2}$ S. 2 miles from the entrance of Osaki, has a round hill 275 feet high. *Djino sima*, East of it a mile, is 400 feet high, has high cliffs towards the sea, and is wooded; it may not be passed inside. A rock awash lies about 2 cables South of it.

Miya Saki, 220 feet high, and 2 miles South of *Okino sima*, is an abrupt wooded peninsula at the extremity of a range of small hills. On its North side the *Arita*, a small stream, disembogues. It is navigable by small junks for a short distance up. *Miya saki* may be passed at 3 cables.

Takahara Bay is 5 miles deep and 6 miles across, between *Miya saki* and *Sirasai saki*, its North and South points of entrance. At its head is the bay of *Hirowatali*, with anchorage in 7 to 8 fathoms, well sheltered from all winds except W. by S. A pier at the South end of the sandy beach at its head, and off a small town, protects small craft in a shallow inner harbour.

Two islands, *Kura sima* and *Taka sima*, lie off the southern shore of Takahara Bay. Both these islands may be passed at 2 cables, except the South point of *Taka sima*, off which at nearly that distance there is a rock awash.

The *Karano* group of small islands with reefs about their North sides, lie N.N.E. of *Taka sima* and West of *Hirowatali* Bay, with a cluster of rocks

E.N.E. of them half way to the shore, the ground about which has not been examined.

Unless desiring anchorage or working to windward against tide, Takahara Bay should not be entered within a line joining its points, as there are two dangerous rocks lying in the centre and northern parts of the bay. *Golden Rock*, the other, so named from the large amount of property lost there, is a very small patch, nearly awash at low water, and so steep that the lead gives but little warning. It lies S. by E. $\frac{3}{4}$ E. of Miya saki. The *Sung-ami*, three-quarters of a mile North of the West point of Karamo, is a sunken rock with 6 feet over it, and equally steep-to. It is also $1\frac{1}{4}$ mile N. by E. of Taka sima, and S.E. $\frac{1}{4}$ E. $2\frac{1}{4}$ miles from the point S.E. of Miya saki.

Sirasai Saki or *White Rock Point*, derives its name from the large masses of quartz in its cliffs, and which, with the white pinnacle rock 200 feet high, 4 cables E.S.E. of it, show very distinctly from the South. The point is not high. A large round rock lies one cable N.W. of the point. Turtle were seen here. *Fisherman Reef*, a small narrow rock 4 feet above high water and steep-to on the outside, lies 4 cables West of Sirasai saki. *Oobiki Ura* is a bay between Sirasai saki and Yura no uchi, where a vessel might anchor for the night with the wind off shore.

Yura No Uchi is a harbour 4 to 7 cables in breadth, and 2 miles deep, and being sheltered by the sharp peaked island *Ali Sima* and the extensive reefs off the South point of entrance, always above water, is only open to two points, viz. W. by S. and S.W. by W. Winds from these directions cause some swell inside in a gale, but it is nevertheless a secure anchorage. The smooth round hill, *Kansane yama*, on its North side, 860 feet high and surmounted by a clump of trees, is conspicuous and well marks its position.

HINO MISAKI, being at the turn of the coast, is the most prominent cape in the Kii channel. Its terminal hill, *Hino yama*, is smooth sloped, 675 feet high, and the islet off it may be passed at 2 cables. It is steep-to, but the tide sweeping out of the bay South of it, causes an appearance of broken water, especially with a North wind. From thence the coast runs south-eastward for 19 miles to Tanabe.

At $2\frac{1}{4}$ miles E.N.E. of Hino yama, on the East of the range extending from it, is a high flat-topped saddle of nearly 1,000 feet elevation, and very conspicuous from the S.E. Along this beach anchorage may be obtained in 4 to 9 fathoms at about half a mile off shore.

The only danger in approaching the anchorage, near the mouth of the small river *Hida ka kawa*, is a large flat reef, named *Nosima*, the inner part of which is 15 feet above high water. It lies two-thirds of a mile off the coast, a mile South of the river's mouth.

Ilibe Saki.—The round smooth hill, *Kirime yama*, rises over this prominent point. The coast to the S.E. of the range has several outlying reefs, the

largest of which extends 4 cables off Arari Point in detached parts, and its extremity is S.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles from Ilibè-saki. Eastward of Arari Point is a bay affording good anchorage in 5 to 8 fathoms.

North of Arari Point is a round hill, on the summit of which are three spike-shaped monuments; and 3 and 4 miles inland, North and N.E. of this, are two large hill clumps which are very conspicuous from the offing.

TANABE BAY is formed in a bight of the coast, 22 miles S.W. of Hino misaki, its outer parts exposed only to West and N.W. When approaching from the south-eastward, *Itsive misaki*, the most projecting point of the coast, will first be made, and being very similar to Cape Tanabè, the bay between them, in thick weather, may be mistaken for that of Tanabè. *Itsive misaki* is a sloping point with a low terminating cliff, but the hills over it are much higher than those of Cape Tanabè, and rise to a sharp peak, the outer of a continuous high range. The summit of Cape Tanabè, which has a single conspicuous tree on it, is only 539 feet high, and falls abruptly inland.

Isaki Point, North of the cape, is very dangerous, a reef with two islets on it extending North half a mile from the point, and the Isaki reef of flat rocks above water, lying that distance West of it. There are sunken reefs and shoal water between the latter reef and the point, and off both reefs the shoal water extends 2 or 3 cables beyond the outer visible dangers.

In the north-western part of entrance of Tanabè Bay are the Saito and North Bay reefs, 4 cables apart with a deep water channel between them. These reefs are low and quite flat. At 2 cables distance S.E. and North of Saito, the southern of them, are sunken rocks, and off North Bay Reef is a small rock like a boulder. In bad weather with the wind in, all the known dangers would break.

The best anchorage is in the south-eastern arm of the bay, South of Anchorage Island. This island may be recognized by the dark trees dotted over it, and a tree islet West of it from which a long uncovered reef extends. The end of this reef may be passed at a cable; then steer to pass the same distance of the north-east point of Anchorage Island, between it and the sunken rocks of Passage Reef in 6 to 10 fathoms, irregular bottom. Having passed along the East side of the island, stand in S.W. $\frac{1}{2}$ S., anchoring in 10 to 8 fathoms, in a secure and thoroughly sheltered position.

The north-eastern part of Tanabe Bay has many shoals. In the centre of the bay is the Binzli, an extensive reef with several rocks on it, dry and awash at low water. On the North shore a small river discharges itself, running close under the white loop-holed wall surrounding a residence of the Daimio, the imperial Prince of Ksiou. The village of *Tanabe* stands on the shore of the sandy bay to the westward of the river, and to the North is a mountain range, the highest part of which rises to the height of 2,650

feet, the ridge curving round to the range which terminates in Itsiyo misaki.

Tanabe has proved at times a convenient anchorage, the usual position for anchoring being South of the Daimio's residence, but better shelter in westerly winds would be found N.E. of the Binzli Reef. Two sunken rocks have lately been discovered in the fairway to the above anchorage; one of 22 feet water is S. $\frac{1}{2}$ E. $4\frac{1}{2}$ cables from the islet off Maru-yama point; the other with 15 feet is S.S.E. $\frac{3}{4}$ E. at the same distance. To anchor, stand in for the green earthwork East of the white wall of the Daimio's residence, bearing E.N.E. till Ebisima shuts in with the islet off Maru-yama Point; then keep East and anchor in 6 to 4 fathoms. The low rock of Binzli always shows.

SIWO MISAKI.—The shore from Itsiye misaki to Siwo misaki, a distance of 21 miles E.S.E., is very bold and under a high mountainous coast terminating in a promontory of table land, which is the extreme South point of Nipon. There is a great race off Siwo misaki, immediately North of which the tides are felt, though the Japan stream washes the South shore of this and of Oö sima. After a south-easterly gale the sea comes in round this point in immense rollers, such as are rarely seen on any coast.

Directions.—Passing through the Kii channel it is recommended to steer always for Hino misaki. The course from Isumi Strait is South 25 miles, and from Naruto S.E. by S. 30 miles, which latter course, continued for 25 miles further, passes Itsiye misaki at about 3 miles, from which an E.S.E. course for 25 miles leads on to Siwo misaki.

OO SIMA HARBOUR is formed between Oö sima and the East side of the extreme South point of Nipon (the East point of entrance to the Kii channel) which is a curious clump of land, 300 feet high, named Siwo misaki, connected to the mainland by a low isthmus. Its vicinity was surveyed by Commander J. Ward, R.N., H.M.S. *Acteon*, in 1861. The harbour has two anchorages; one in the bay on the S.W. side of Oö sima, completely sheltered, but the water rather deep; the other in 4 to 6 fathoms, muddy bottom and good holding ground, off the village of Hasikiwi on the mainland in the northern part of the harbour.

Hasikiwi Anchorage is well sheltered except to the N.E., where it is open from a small arc; it has also some protection from the remarkable chain of rocks, from 20 to 75 feet high, extending in a southerly direction half a mile from the shore eastward of the village, but being detached with deep water between, they do not form a perfect breakwater. *Pisayama Rock*, the innermost, is in lat. $33^{\circ} 29' 8''$ N., long. $135^{\circ} 48' 55''$ E. The best position is with *Itsino sima*, the outer rock of the above chain, bearing E.N.E. distant $1\frac{1}{2}$ cable, and *Mioga sima*, South, or on with *Isumo saki*, the West entry point.

This very eligible harbour is largely resorted to by windbound junks, and it offers every facility for repairs and replenishing supplies. There are three

villages, two on the mainland and one on the island. Water is easily obtained from the latter village, it being led down in bamboo pipes to the rocks, which have deep water alongside them. The large village of *Kusimoto* on the isthmus, is well supplied with all the essentials usually required by the coasting trade.

The cargoes of the windbound junks consisted of rice, sugar, tobacco, charcoal, salt, sake (spirits), and dried fish. Charcoal of an excellent quality for steaming purposes was obtained from them. The villagers supplied fish and poultry; some deer were brought off, also a few bullocks, and a small quantity of vegetables.

Approaching *Oō sima* harbour from the westward, a heavy tide race is often met with off *Siwo misaki*, which is skirted by uneven masses of rock, most of it showing at low water, with rocks awash 3 or 4 miles from shore. *Bottle Rock*, lying South a quarter of a mile from the point, has some foul ground $1\frac{1}{2}$ cable outside it; a rocky spit extends about a quarter of a mile off *Wedge Head*, and there is broken ground at nearly the same distance off *Isumo saki*.

To clear these dangers, the right extreme of *Oō sima*, the most southern point seen, must not be brought eastward of E.N.E. until *Mioga sima* comes well open of *Isumo saki* N.N.W., when it may be steered for, taking care not to bring it northward of that bearing until within half a mile of it, or until the East extreme of *Isumo saki* bears S.S.W. $\frac{1}{4}$ W., when steer N.W. $\frac{1}{4}$ N., passing mid-channel between the land and *Mioga sima*, which has a small ledge running off its South side; after passing *Mioga* steer for the anchorage of *Hasikiwi*.

If compelled to work in, the *Oō sima* shore is the clearest, but take care to avoid a *dangerous rock* lying nearly 2 cables westward of the N.W. part of *Tsuya sima*, an island 120 feet high off the S.W. point of *Oō sima*. The S.W. bay of *Oō sima* is clear of danger.

Koza-Gawa is a small but opulent town situated on the East side of the entrance of a river, $2\frac{1}{4}$ miles N.N.E. of the North point of *Oō sima*. The river has a shifting bar, but a channel is always available for coasting junks. Generally speaking breakers show the position of the shoals, and what to avoid when entering. At high water, which is about 7^h full and change, 10 feet may be looked for on the bar, probably more, but strangers should adopt the precaution of sending a boat ahead to sound.

At the North end of the town is an extensive timber yard, in which are spars of considerable dimensions. *Koza-gawa* is also the seat of an important whale fishery.

URA-KAMI HARBOUR is an inlet running $1\frac{1}{2}$ miles in a W.S.W. direction into the land at 8 miles N.E. of *Oō sima* harbour, and, although small, affords excellent shelter in 4 to 5 fathoms, over stiff muddy bottom. For steamers it offers an admirable haven, but being only a quarter of a mile

wide, sailing vessels might experience a difficulty in getting in or out, particularly entering, as from the direction of the valley at the head of the harbour the wind, which may be free outside, is frequently found inside to be blowing straight out.

In entering take care to avoid a spit of rocks projecting upwards of half a mile in a N.E. direction from the South point of entrance. One of them, named *Iive*, is 36 feet high, and some are covered, but show sufficiently to render them easily to be avoided.

The **COAST** for 130 miles N.E. of Ura-kami has only been partially examined, but is delineated from the Japanese manuscript.

Goza Inlet, in lat. $34^{\circ} 17' N.$, long. $136^{\circ} 46' E.$, affords shelter from all but West winds, but has very uneven rocky bottom, and ledges off all the points. It is therefore recommended not to anchor farther up than abreast the first opening on the North, in 5 to 7 fathoms.

CAPE XIMA or **Sima** is directly S.E. of Goza Inlet. From time to time rocks have been reported to lie off it, and an examination has proved them to be of the most dangerous character. Two low and small islands, called *Osi-ma*, with clumps of large trees on them, stand a mile or two off the coast between Cape Sima and Goza entrance, from which long reefs were seen extending in all directions, and detached sunken rocks to crop up in various places. These generally break, owing to the constant swell caused by the strong tides off the cape. The outer rock which breaks is S.W. $\frac{1}{2}$ W. of Nami-kiri-saki, S.S.E. $\frac{1}{2}$ E. 5 miles from the wooded entrance head of Goza, and S. by W. 2 miles from the outer *Osi-ma*. Numerous tide rips occur outside the reefs.

Matoya Harbour lies 5 miles North of Cape Sima, and is open only to the East; half a mile within its entrance, anchorage may be obtained in 7 fathoms, but beyond this the harbour has not been examined. A cluster of rocks lies in the entrance, North of the South head, on which is a Japanese *lighthouse*.

To the northward of this are the extensive inlets called *Owari Bay* and *Mikawa Bay*, of which we have no accounts but the information given by the Japanese survey. From Irako-saki, their eastern part, a straight coast trends to the eastward for 28 miles to Hamana, which was not seen in passing it, and, therefore, it is presumed to be shallow. The water about here is much discoloured.

OMAE-SAKI is a dark wooded bluff 150 feet in height, terminating a very sandy shore with high beaches, backed by wooded hills. It may also be recognized by two remarkable white patches, only one of which is visible from East to West. Two miles E. by S. of its southern point are the *Lady Inglis Rocks*, separated by a 6 fathoms channel, reefs extending 2 cables from

the shore. It was discovered by the wreck of the *Lady Inglis*, Captain H. Twizell, of Shields, in December, 1859, but its position is here accurately given by Captain Bullock. The reef quite covers at high water, and does not always break. It should have a beacon. In a S.W. gale good shelter may be obtained under the lee of Omae-saki in 7 to 4 fathoms, not closer in. A vessel may pass inside the reef by giving the shore a berth of a mile. The bottom is everywhere sand, with shells and stones. There is a *lighthouse* on the South bluff.*

CAUTION.—As the Lady Inglis Reef, and also the Portsmouth Breakers, lie in the direct route of vessels bound to Simoda and Yedo from the westward, a good look out should be kept, and more than ordinary care taken when approaching their locality. It may easily be avoided by a passing vessel in favourable weather, as parts of it being dry at low water the reef must nearly always show itself by breakers. Although the position assigned on the chart to the Portsmouth breakers has been sailed over by H.M. ships, and in all kinds of weather, nothing has been seen since first reported, and it seems highly probable they are either identical with the Lady Inglis Reef, or that a shoal of fish or a current overfall caused the disturbance in the water, which gave birth to the report.

The current sets strongly through the various passages between the chain of islands off the Gulf of Yedo, and this should be remembered, particularly in bad weather. As before stated, in their vicinity, in fact throughout the path of the Japan current from the South end of Formosa to Behring Strait, constant heavy tide rips† will be encountered, which, in light winds, frequently render a vessel for a time unmanageable.

GULF of SURUGA (the *Tutomi Gulf* of former charts), the waters of which wash the western shore of the peninsula of Idsu, is 34 miles deep and 23 miles wide at entrance, and, with the exception of the Lady Inglis Reef, lying E. by S. 2 miles from Omae-saki, the low sandy West point of entrance, is free from any impediment to navigation. The water in it is very deep, no bottom at 250 fathoms being found at mid-entrance, none at 160 fathoms midway across near the head of the gulf, and none at 110 fathoms at a little more than a mile from the western shore.

* *Portsmouth Breakers.*—Captain Foote, of the U.S. frigate *Portsmouth* reports, 30th of March, 1858, that he nearly lost his vessel on a reef of rocks, about 35 miles in a south-westerly direction from Simoda, and 13 miles from the nearest land, but no indication of such a shoal was found by Captain Bullock, though a remarkable discolouration of the water has been seen.

† These rips have often been mistaken for shoals. See description of Japan stream, pp. 449, 450.

The eastern side of the gulf, the shore of the Idsu peninsula, is generally a belt of cliffs, broken, however, into several deep water havens, which, though small, afford good anchorage, but for sailing vessels with a foul wind are all difficult of access, and the entrances of those harbours that are known, Tago, Arari, Heda, and Eno-ura Bays, on the Idsu shore, are too narrow to admit of much manœuvring.

FUSIYAMA.—At the head of the gulf is Fusiya, the highest mountain in Japan, and although its summit is 15 miles inland, it appears in clear weather to rise nearly abruptly from the beach.

Fusiya is held to be sacred by the Japanese, and is the object of pilgrimage. The first Europeans who ascended it were a party of eight Englishmen, at the head of whom was Sir Rutherford Alcock, C.B., the British Envoy and Plenipotentiary in Japan. They left the Consulate at Kanagawa, September 4th, 1860. The crater on the summit is about 1,000 yards long, 600 yards wide, and 350 yards deep. The height of the edge of the crater was found to be 13,977 feet, and the highest peak 14,177 feet, lat. $35^{\circ} 21' N.$, long. $138^{\circ} 42' W.$ *

The high road between Yedo and Miako and the western province forms a tangent to the head of the gulf, and it is very probable that the *railroad* from Yedo to Osaka, &c., proposed by the Japanese Government, will pass by the same route.

SIMIDZU HARBOUR, surveyed by H.M.S. *Acton* in 1861, is formed by a low flat tongue of land of considerable width, stretching out in a north-easterly direction from the north-western shore of the gulf. It is most commodious, and affords good shelter in 10 to 15 fathoms soft mud, with an inner anchorage at its head, available for small craft, in which, if required, they could be beached for repairs. A small river empties itself at its head.

This tongue of low land is well covered by sugar plantations and villages. Its extreme North point, of sand and shingle, is steep-to, there being no bottom at 100 fathoms at a little more than a mile off shore, and vessels running for the harbour may safely skirt the beach, and rounding the point at 2 cables, anchor by the lead, or as convenient. The town is situated at the South end of the harbour, and appears to be one of some little importance. It is the centre of a large and productive sugar growing district; plantations of the cane are to be seen in every direction.

In a timber yard at the North side of the town were some large spars, pine, and fir (the latter having a very short grain), numerous small rough

* A very interesting account of this ascent of Fusiya, and of Japanese matters in general, is given in the Jour. Roy. Geo. Society, 1861, pp. 322—356.

spars, and small pieces of particularly hard oak. There were quantities of sugar of a very fair quality in the town, also a little flour, a few fowls, fish, and vegetables. Water was obtained from the authorities.

No coal was seen, but a quantity of charcoal. The latter when attainable in sufficient quantities is admirably adapted for steaming purposes.

ENO-URA BAY,* an excellent harbour, reported by the Japanese to be a much better harbour than Simidza, lies in the N.E. angle at the head of Suruga Gulf, in lat. $35^{\circ} 3' N.$, long. $138^{\circ} 53' E.$ It is 9 cables long, North and South, and 6 cables deep. *Ara sima*, a wooded island affording shelter from westerly winds, lies off the South point of entrance, and there is a small monument on the North point. The soundings in the bay are deep, 20 to 30 fathoms, and it is open to the West, but there is good shelter from all winds in a small bay in its northern part, where the depth is 13 fathoms over a bottom of fine sand. In steering for this small bay, keep midway between its western shore and the cliffs on the eastern. A town stands on the western shore.

There is a river in Eno-ura Bay, but as water is obtained from it with difficulty on account of its shallowness, it is best to procure it from the town wells. There is abundance of fish and vegetables. The rise and fall of tide is about 4 feet.

Heda Bay, in lat. $34^{\circ} 58' 11'' N.$, long. $138^{\circ} 46' E.$, is 8 cables in extent N.W. and S.E., 4 to 9 cables wide, and carries a depth of 8 to 22 fathoms over a bottom of fine sand. It is a safe and accessible anchorage, and is sheltered on all sides by high mountains. There is a village in a valley. Fish and vegetables are abundant.

The entrance to the bay, a quarter of a mile wide, and open to the N.W., is to the northward of a low and sandy spit extending half a mile in a northerly direction from the southern shore. The rise of tide is $5\frac{1}{4}$ feet.

Arari Bay, sheltered also from all winds, but only fit for small craft, is in lat. $34^{\circ} 50' N.$, and long. $138^{\circ} 46' E.$ Its extent is 4 cables North and South, and 2 to 6 cables across, and the depths are 6 to 12 fathoms over fine sand. The shores of the bay are mountainous. Water may be conveniently obtained from the village on the eastern shore; fish is plentiful.

The entrance is open to the N.W.; in entering keep in mid-channel, and when a small island opens, steer between it and the sandy point to the S.W.

Tago Bay, in lat. $34^{\circ} 47' 3'' N.$, long. $138^{\circ} 44' 54'' E.$, is 4 cables in extent

* The description of Eno-ura, Heda, Arari, and Tago Bays, is by Lieut. Elkin, of the Russian frigate *Diana*, 1853--55.

North and South, and half a mile wide. It is sheltered from all winds, and carries a depth of 12 to 20 fathoms, soft mud bottom. There is a small town here, and water can be obtained from the wells. Fish and vegetables can be procured.

In steering for the entrance, which is also open to the N.W., two islands (lying half a mile W.N.W. from the South point of entrance) will be seen, with rocks and breakers extending to the southward from them. Pass northward of these islands, between them and the mainland.

These four bays just described will serve as a refuge from S.W. winds, which cause a great swell in Suruga Gulf. Their coasts are wooded and mountainous, attaining the height of 1,000 feet. The entrances must be approached fearlessly, for the high coast conceals them, and the bays only open when within a mile.

VOLCANIC ISLETS, SOUTH-EAST OF JAPAN.

A very remarkable range of detached islets and rocks extends for nearly 300 miles in a S.S.E. direction from the entrance of the Gulf of Yedo. There is no portion of the ocean which has been more misrepresented than this in our older works, and the great number of supposed discoveries rendered the charts so confused that no adequate idea could be gained of their number or arrangement. The author endeavoured in 1858 to reconcile these vague surmises and great discrepancies, so as to give a more correct representation of their real character.*

This geographical confusion has arisen no doubt from the unsuspected influence of the great Japanese current, which rushes through the group with exaggerated and uncertain velocity, and thus affecting the dead reckoning of many or most of the ships which announced discoveries, most of which are to the eastward of the true positions. It will be unnecessary to discuss these varying accounts, since they are now in a great measure reconciled by exact observations; and this is of the greatest importance, seeing that an increasing commerce between China, Japan, and North-Western America, passes through these channels. What follows will, therefore, be confined to a brief description of what is well ascertained, connected with an identification, when possible, with what has been but vaguely surmised.

OO-SIMA, or **Vries Island**, is the northernmost of these islands. It is sometimes called *Ohosima*; and, being an active volcano, Krusenstern applied the name of *Vries Island* to it, to distinguish it from that to the southward. On Von Siebold's chart it is called *Barneveld's Island*. Its south-eastern

* See Transactions of the British Association, 1858.

point is in lat. $34^{\circ} 39\frac{1}{2}'$ N., long. $139^{\circ} 28'$ E. The island is oval shaped, about 8 miles in extent N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E., and 5 miles wide, and its summit attains an elevation of 2,556 feet. At its centre is an active volcano, over which a white vapour cloud is generally floating, and frequently, at night, it brightly reflects the glare of the subterranean fires at work in the crater beneath, forming in clear weather a conspicuous landmark visible by night or day for many leagues.

There are several villages on the island, and a considerable population. The coast line is free of all danger, with the exception of a few detached rocks and boulders lying close to it. The principal village is on the North side, off which a narrow bank of soundings affords a precarious anchorage in 12 to 18 fathoms. Another considerable village, having the advantage of a junk harbour, is situated at the south-east point of the island. Landing may be effected at the North village, or in the junk harbour. The inhabitants were civil and hospitable, but averse to strangers visiting the volcano.

The *Broken Islands* of the old charts lie to the southward of Oô-sima. They are now tolerably well represented on the charts, having been examined by H.M.S. *Actæon* in 1861. They consist of the following.

To Sima, bearing S.S.W. 10 miles from Oô-sima, N. $\frac{1}{2}$ W. 2 miles from Utoné, is one mile in diameter, pyramidal shaped, and its summit 1,736 feet above the sea.

Utone' is a conical islet, 666 feet high. Detached rocks lie near its shores.

III SIMA is about $2\frac{1}{2}$ miles S. $\frac{1}{2}$ W. from Utoné, and $1\frac{1}{2}$ miles N.E. of Sikine, and from its broken outline appears from a distance as several islands. Its extent is 5 miles, North and South, and its most elevated part 1,496 feet above the sea. There is a small low islet a short distance off its S.E. point.

Sikine Sima is low, with a small islet off its North end. It is $1\frac{1}{2}$ miles long N.N.E. and S.S.W., and lies 5 miles N.E. of Kosu sima. One of the vessels of the American squadron passed between these islands, and saw no danger; there is, therefore, reason to believe that the channel is safe.

KOSU SIMA, in lat. $34^{\circ} 13\frac{1}{2}'$ N., long. $139^{\circ} 8'$ E. (centre), and elevated 2,000 feet above the sea, is $3\frac{1}{2}$ miles long N.E. and S.W., and may be recognized by a remarkable snow-white cliff on its western side, and a white patch on its summit, to the northward of the cliff. There is a safe channel 15 miles wide between Kosu sima and Miaki.

Two small rocky islets (on Japanese authority) lie close together about half a mile off the centre of the eastern shore of Kosu sima. About 2 miles southward of the S.W. point of Kosu sima are the *Brood Rocks*, which should be given a safe berth, as their jagged appearance would lead to

the belief that there are many hidden dangers in their immediate neighbourhood.

Onohara is a small islet W.S.W. 5 miles distant from Miaki. It is not known to have been visited by Europeans, but from a distance appears to maintain the usual bold characteristics of the other islands.

REDFIELD ROCKS, or *Sanbon-take*, were thus named by Commodore Perry, U.S.N., in 1854, after the well-known meteorologist, and he also ascertained their exact position (see Narrative of U.S. Japan Expedition, p. 481).

They are the most western of the chain of islands and rocks South of the Gulf of Yedo, and the most dangerous of the whole group. They consist of two patches of black rocks extending nearly 3 miles N.N.E. and S.S.W., and have deep water all round them. The southern rocks, in lat. $33^{\circ} 56' 13''$ N., long. $138^{\circ} 48' 31''$ E., are the highest, about 20 feet above high water, while the northern are only about half that height. Nearly midway between the patches is a *flat rock*, over which the sea breaks heavily, and the heads of two or three small rocks crop up around it. There is said to be deep water between the flat rock and the northern patch, and the channel is reported to be clear, but except in a case of sudden emergency it would not be prudent to attempt passing through.* The northern group is in lat. $33^{\circ} 57' 31''$ N., long. $138^{\circ} 49' 13''$.

The hand lead will afford no warning when approaching this dangerous cluster, and in thick weather the islands in the vicinity, the nearest being Kosu sima, N.E. $\frac{1}{2}$ E. 20 miles distant, would not be seen; in fact, seeing the islands, the dangers themselves would be visible, and therefore easily avoided.

A depth of 70 fathoms, gravelly bottom, was obtained about 4 miles northward of the rocks; and at 2 miles West of their centre there was no bottom at 130 fathoms. The current in their vicinity set on one occasion about N. by E., and its rate was 2 to 3 knots.

MIAKI, Mitake, or Volcano Island.—The summit of this island is in lat. $34^{\circ} 6' 6''$ N., long. $139^{\circ} 31'$. It is called Brandten Eyland (burning island) by De Vries, who places a group of rocks to the S.W. of it. Broughton says that there are, in addition, some black rocks at the distance of 2 or 3 miles from the East point of the island. According to him Volcano Island is large, well cultivated, and covered with verdure to the summit of a very high mountain which stands on it, and presents a very agreeable prospect.

Mikura, or Prince Island of De Vries, is also high. Its summit is in lat.

* Captain J. E. Donnell passed through this channel on May 6th, 1850. He says that the whole group is very dangerous.

33° 52', long. 139° 34'; Von Siebold marks it as the Ongelukkig Eyland of De Vries.

BROUGHTON ROCK, or **Kanawa**, in lat. 33° 39' N., long. 139° 17½' E., is a small inaccessible islet about 65 feet high, flat topped, and so bold that at about a third of a mile from its N.E. side no soundings could be obtained with 180 fathoms line.

The northerly current in the neighbourhood of this islet was found to be particularly strong, running nearly 4 knots an hour.

FATSIZIO ISLAND, the most southern of the islands visited by the *Acteon* in 1861, is 8½ miles long, N.W. by N. and S.E. by S., and 4 miles wide at its broadest part. In shape it is nearly an oblong, rounded at the N.W. end, while at its S.E. end a slight curve forms a bay, the spot of observation in which, close to some small huts, is in lat. 33° 4' 24" N., long. 139° 50' 24" E. Anchorage was obtained off this bay in 16 fathoms, sand and gravel, at less than a mile from the shore, but quite exposed from S.S.W. to N.N.E., and a vessel would always be liable to experience a heavy swell. There were 30 fathoms, dark sand, at about 2 miles off this shore but the rest of the coast line appeared to share the bold features and to be as steep-to as the generality of these islands.

This island is a penal settlement of Japan. Its highest part is the northern, where a mountain reaches an elevation of 2,846 feet. At the base of this mountain, and creeping up for some distance on its West side, is an extensive settlement, while in several places along both shores, are found little hamlets and villages, so that the island would appear to support a considerable population. A tract of low land in the centre of and extending across the island is well cultivated. To the southward of this the land again assumes a considerable elevation, but does not reach the altitude of the northern part.

At the S.E. end of Fatsizio are two or three small streams of delicious water falling down the rocks, and in fine weather and smooth water boats may readily obtain an abundant supply.

Kodsine is a small and nearly oval shaped island, 1,826 feet high, 1½ mile long, and nearly one mile broad, lying westward of the highest part of Fatsizio, and separated from that island by a channel about 2 miles wide which has not yet been sounded. Some small rocks, as is also the case with Fatsizio, are found quite close in shore, but no off-lying dangers are at present known, and the lead gives no soundings at 53 fathoms, a little more than a mile from its western shore. A small population is to be found on the lower part of the island.

AOGA, or **Onango-sima**, or *South Island*, is a Dutch discovery verified by Colnett. It was also reported as a new island of Captain Drescher, in the Hamburg barque *Walter*, August 18, 1852. It was not visited by H.M.S. *Acteon* in 1861, but the position of its eastern summit was assumed (from

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KONING WILLEM III. ISLAND.

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true bearing of it from Fatsizio, and the difference of latitude from a
Japanese chart proved very nearly correct in most details) to be in lat.
 $32^{\circ} 37\frac{1}{2}'$ N., long. $139^{\circ} 47\frac{1}{2}'$ E. The island is 3 miles long, and visible 36
miles off in clear weather. Its coasts are steep, and the only landing place
is on the East side, where there is a rock level with the water at a little dis-
tance from the land. It is inhabited and cultivated on the North and N.W.
sides.

KONING WILLEM III. ISLAND was seen, if not discovered, by Captain
A. C. Van Braam Houckgeest, in H. Netherlands M. brig *Koerier*, on
August 24, 1849, determining the position as lat. $31^{\circ} 52' 48''$ N., long. by
three chronometers as $139^{\circ} 58' 46''$ W. It was named after the King of
Holland. A reef hereabout was seen, according to Mr. Reynolds' memoir,
(page 212), in 1825, on the authority of Captain Macy, by Captain Coffin.
If this be correct, it ought to be called *Coffin Island*. Most likely it is the
same as *Tibbitt Island*; but, as stated below, there is still considerable doubt
as to the positions of this dangerous cluster.

This reef was evidently seen by the *Elizabeth Kimball*, in May, 1863. Her
commander places them in $31^{\circ} 52'$ N., long. $139^{\circ} 53'$; the current setting
N.E. 2 knots. A *shoal* was plainly seen, the bottom visible in about 5
fathoms, at 7 miles W.S.W. from the rocks. Strong rippings will be en-
countered at 8 or 10 miles W.S.W. of their position.

Notwithstanding these circumstantial accounts which so nearly accord in
their position of this reef, there is much difficulty in determining whether
there is more than one reef, as will be seen below.

La Bayonnaise Island is one of these difficulties. It was seen by Captain
Jurien de la Gravière, in the French corvette *La Bayonnaise*, on May 31,
1850, fixing the position as lat. $32^{\circ} 0' 41''$ N., long. $130^{\circ} 59' 20''$ W., or *eight*
miles North of the *Koerier's* position of the island above mentioned. But
the descriptions of each accord exactly. The French account is that it is a
low, lurking curvilinear reef, under 400 feet in extent, with a few peaked
rocks at its North end. The highest hummock is at the North end, and not
more than 20 feet high. There are three pinnacles, and when seen from the
South, the North rock seems as a column.

On August 18, 1852, Captain Drescher, of the Hamburg barque *Walter*,
saw an island at noon, which coincides in position with South Island. At 5
p.m. he saw a cluster which resembled those seen in *La Bayonnaise*, but
which he places $6\frac{1}{2}$ miles to the N.W. On April 2nd, 1856, the barque *Live*
Yankee passed this neighbourhood. A confused report from the commander,
Captain Grove, states that he saw a cluster of rocks, the highest about 40
feet high, between the latitudes of the rocks seen in the *Koerier* and *La*
Bayonnaise. Another island was seen to the northward, and also South

Island. This, if correct, would settle the question as to there being *two* islands.*

It is much to be desired that these rocks should be properly surveyed and placed on the charts.

SMITH ISLAND, the next to the southward, was reported by Captain Smith, of the *Heber*, from Whampoa to San Francisco. It was first seen in March, 1846, during a gale of wind; and on the return voyage, in December, 1846, a boat was sent alongside during a calm, lat. $31^{\circ} 12'$, long. $139^{\circ} 55'$. It is of a needle shape, and probably 300 feet high, but not more than 250 feet in diameter at the base. (This has a suspicious resemblance to St. Peter's Rock.) It is surrounded by smaller peaks beneath the surface, but there is no danger near it.†

But notwithstanding the doubt as to its position, there can be no question of its existence; for Captain John K. Stickney, of the American barque *Sarah Warren*, after seeing Ponafidin Island, saw this rock, which he describes as resembling a ship under sail, and N.N.W. $\frac{1}{2}$ N. 8 or 9 leagues from the former. At a short distance East of it was a rock, on which the sea broke furiously.

The position given by H.M.S. *Tribune*, which passed it January 18, 1859, is lat. $31^{\circ} 18' N.$, long. $139^{\circ} 50' E.$, a high pinnacle-looking rock, about three-quarters of a mile in circumference, with heavy breakers extending apparently a quarter of a mile from it, and a small rock close to on the North side.

Jeannette Island is probably the same. It is merely stated by Admiral Krusenstern and Mr. Reynolds to be in lat. $31^{\circ} 30' N.$, long. $140^{\circ} 0' E.$, and an exaggerated report by the ship *Hurricane*, Sept. 3rd, 1852, refers most likely to the same. *Todos los Santos* and *San Tomas*, of the old charts, may refer to this or the next.

Ponafidin Island was discovered in 1820, by the Russian lieutenant of that name, in lat. $30^{\circ} 29' N.$, long. $140^{\circ} 6'$. He gave the name of *Three Hill*, or *Three Hummock Island*, to it.

ST. PETER'S or BLACK ROCK, perhaps *Lot's Wife*.—In 1821, Lieut. Povalichin, of the Russian navy, discovered a rock of the form of a truncated cone, in lat. $30^{\circ} 31'$. Krusenstern thought it to be the same as Pona-

* Besides the notices above cited, there are many others which it is almost certain refer to one or other of these groups, if there be more than one. Of these the *Sylph Rock* of Mr. Dobell; *San Mateo Island* of the old charts; the island seen by Captain Moor; *Clerk's* or *Clark Reef*; the *Flavius Rock*, seen by Captain W. J. Rogers, Feb. 7, 1851; and several more which need no further notice.

† There is much doubt as to this position, for Admiral Krusenstern's track, Sept. 23rd, 1826, passes close to it. In Mr. Reynolds' memoir two other rocks are reported at 22 and 72 miles respectively, due West of it.

fidin discovered, but the descriptions do not agree. In 1853, Captain A. Somerby, commanding the American barque *Isabelita Hyne*, discovered an island or rock, of very singular form, in lat. $29^{\circ} 42'$, long. $140^{\circ} 15'$. It is about 200 feet high, and 100 feet in diameter, with quite perpendicular sides. He ran within 3 miles of it, no bottom. It looks black, having the appearance of a bottle. He called it *Black Rock*, and considered it to be very dangerous, for if struck by a vessel there is little chance of getting on the rock; and, if gained, not a vestige of vegetation on it. It has a little lean to the West, bearing North. His observations were good both for chronometer and latitude. (From the description this must be the same as that discovered by the Russian officer above mentioned.) It was also seen by the *Linda*, in 1851, by which it is placed in lat. $29^{\circ} 42'$, long. $140^{\circ} 31' E.$, and was thought to be like a ship.

It was seen by the ships *Macedonia* and *Vincennes*, of the U.S. North Pacific Surveying Expedition, and is placed by the former vessel in $29^{\circ} 47' N.$, long. $140^{\circ} 22' 30''$, which must be taken as correct. Its altitude was calculated to be 299 feet, and its base 40 feet.

This very extraordinary rock, unlike almost every other known isolated peak, is thus correctly placed on the chart, but it has been, and perhaps still is, the subject of much doubt.

Captain John Meares, well known in the history of early discoveries in the North Pacific, passed this, or a similar rock, when in command of the *Felice*, April 9th, 1788. Like most others who first saw it, he took it for a ship—a first-rate man-of-war, under a crowd of sail. "It obtained the name of *Lot's Wife*, and is one of the most wonderful objects, taken in all its circumstances, which I ever beheld. The waves broke against its rugged front with a fury proportioned to the immense distance they had to roll before they were interrupted by it. It rose almost perpendicular to the height of near 350 feet. A small black rock appeared just above the water at about 40 or 50 yards from its western edge. There was a cavern on its S.E. side, into which the waters rolled with an awful and tremendous noise."—(Meares, p. 97.)

Its position, as stated by Meares, was $29^{\circ} 50'$, long. $142^{\circ} 23'$, or about 105 miles eastward of that assigned to the St. Peter's Rock. This would certainly not be too much to allow for the strong easterly drift, unsuspected by Meares; but a singular and inexplicable difference is shown in Meares's chart, which places *Lot's Wife* in long. $156^{\circ} 0' E.$, or $15\frac{1}{2}$ degrees to the eastward. This position is not at all borne out by the text, which describes his passing islands and land, which can hold no relation to it; and therefore, at present, it must be taken as erroneous.

It may, therefore, be considered that this volcanic mass, *Lot's Wife*, is identical with St. Peter's Island, until it is disproved. It is also the same

as the *Haystack* of Krusenstern, and possibly the *Rica de Oro* of the old charts.

The continuation of this line of volcanic eruptive rocks, through the Volcano, and Bonin Islands, &c., will be described hereafter.

THE GULF OF YEDO.

The **GULF of YEDO**, connected with Yedo Bay by the Uraga channel, is bounded on the West by the mountainous peninsula of Idsu (terminated to the southward in Cape Idsu, the southern point of which is 52 miles distant) and on the East by that of Awa. From it the coast rounds in a N.E. direction 26 miles to Futo saki, its general features being high, rocky, and even, having near Simoda a few sandy beaches. Between Simoda and Futo saki, the coast is bold of approach. Over it, the mountain *Amagi yama* rises to 4,700 feet, and on the north-east ridge is a conspicuous dome-shaped hill.

From Futo saki the coast trends more to the northward, forming a slight bend to *Fuku-ura*, where it becomes more broken, but maintains its bold features under a lower range, the two highest points of which are elevated 2,970 and 2,466 feet; under the latter is a round hill with a large quarry facing the gulf. From these hills the long low promontory of *Manatsuru*, bordered by vertical cliffs, stretches to the eastward, and off its extreme point is a rock 20 feet high. On its West side is the open bay of *Fuku-ura*, not yet surveyed. From thence the coast assumes a lower elevation, and gradually bending round to the eastward forms the treacherous Bay of Odawara. To the northward of Futo saki are some small islands, the largest of which, *Ha sima*, 120 feet high, is about $3\frac{1}{2}$ miles off shore. W. by N. from this island is the small bay of *Ajiro*. The position of this bay is more to the northward than that assigned to it on the chart, it may be distinguished by a small white cliff to the northward; the water in the bay is deep, there being no bottom at 20 fathoms at the entrance; a natural breakwater forms a shelter for small vessels, but the water is deep within it, there being from 13 to 5 fathoms.

The Bay of Odawara, from the lowness of the land at its head, has been (when the charts were in error) mistaken by strangers for the Uraga channel, and occasionally at night by the more familiar navigator. When past Vries Island, however, the channel will be recognised by *Su saki*, its East point of entrance, being comparatively high (645 feet), whereas Cape Sagami, the southern part of the peninsula of that name on the West side of entrance, is not more than 70 feet high, with the exception of a small hill of 200 feet elevation on the centre of its South part, named Tree Saddle, from two conspicuous clumps of large trees on its summit. The *fixed light* on Nosima Point will indicate it by night.

The peninsula of Awa, although mountainous, is less so than Idsu, and possesses much larger tracts of arable land, all of which is carefully cultivated. Its West coast is more sinuous than the opposite shore of the gulf, but only one of the bays, Tatiyama, formed in it, affords fair anchorage. Numerous small off-lying rocks stud the coast from Su saki as far northward as Kanaya point, the outer of which is the *Ghibu-iai* or *Black Rock*, about 20 feet high, lying N. by W. $1\frac{1}{2}$ miles of Daibo point and a mile off shore. To the south-east of it are several small rocks which only uncover at low water. *Kanaya Point* bears nearly East of the Tree Saddle on Sagami Peninsula, and is at the termination of the sharp well defined ridge of the Miogani yama, the fine dome-shaped mountain, elevated 1,096 feet. With the exception of some few of these rocks most of them show above water, and no danger is at present known to be a greater distance than a mile off shore.

To the northward of these hills the country (Kadsusa) becomes much lower, and a few miles north-eastward of Futsu saki, the point off which runs the Saratoga spit, it becomes an uninteresting dead flat, encircling the head of Yedo Bay.

CAPE IDSU, or Iro-o Saki, a fine bold rocky headland which cannot be mistaken, is the southern extremity of the mountainous peninsula of Idsu. It will be recognized by a conspicuous white cliff, $3\frac{1}{2}$ miles to the N.W. of it, and a conical rocky peak a few miles farther in the same direction, forming the south-western extreme of the peninsula. The summit of Cape Idsu is a hill 250 feet high, which falls into two small ridges to the sea. There is an islet 50 feet high a quarter of a mile off the shore, one mile West of the cape.

ROCK ISLAND Lighthouse.—Rock Island, or *Mikomoto*, is about 120 feet high, and a third of a mile in length, with precipitous shores and an uneven outline, bears E. by S. $\frac{1}{2}$ S. about 5 miles from Cape Idsu. A lighthouse was completed on it in 1870. It shows a *bright fixed light* (temporary) at 80 feet, visible 14 miles off. Lat. $34^{\circ} 34' 20''$ N., long. $138^{\circ} 57' 10''$ E.

Between this rock and the main land are the *Ucona* and four other rocks, among which the junks freely pass; but a vessel should not attempt to run inside Rock Island at night. The tides also are uncertain, the north-easterly current, which is not to be relied upon, running sometimes 3 to 4 knots per hour; at other times regular tides have been observed, the flood setting W.S.W., the ebb E.N.E., $1\frac{1}{2}$ miles per hour. The channel between Rock Island and Ucona Rocks carries irregular soundings of 9 and 14 to 30 fathoms.

Ucona Rocks, two in number, though they generally appear as one, bear N. by W., distant 2 miles from Rock Island; the largest is about 70 feet high. Four other rocks occupy a triangular space of a mile from W.S.W. to N.N.W. of the Ucona. The northern and southern of these are small ledges nearly awash. A reef also extends $3\frac{1}{2}$ cables towards them from Tu-

hadgi Point to the N.W. of the Ucona. There is deep water between all these rocks.

SIMODA HARBOUR* is on the eastern side of the peninsula of Idsu, 6 miles N.E. of the cape. To the northward of the harbour a high ridge intersects the peninsula; and South of this, all the way to the cape, it is broken by innumerable peaks of less elevation.

Vandalia Bluff, the East point of entrance to the harbour, will be known by a grove of pine trees on the summit of the bluff, and the village of *Susaki*, which is about a third of the way between it and Cape Diamond.

Cape Diamond, or *Sumegi Saki*, is $1\frac{1}{2}$ miles eastward of the entrance, and immediately off it is a rocky islet, and northward of it the bay of *Sirahama*, which, as it has several sand beaches, may be mistaken for Simoda Harbour; but on approaching this, Cape Diamond will shut in Cape Idsu, the Ucona Rocks, and Rock Island to the southward, whilst in Simoda road they are visible from all points. The town of Simoda stands on the West shore of the harbour, and *Kakisaki* village on the East. There is good landing for boats in Simoda creek, and also at the village.

Simoda (which means "low field") was the port selected, with Hakodate at the South end of Yezo, as the first treaty ports by the American Expedition; and is, therefore, of much interest to the commercial world. The treaty was signed, as is well known, on March 31st, 1854. The first vessel which took advantage of the treaty was the American schooner *C. E. Foote*, fitted out by Messrs. Reed and Dougherty, who came to Hakodate on Feb. 13th, 1855, and then took the crew of the Russian frigate *Diana* from Simoda to Petropaulovski.†

Centre Island, lying nearly in the middle of Simoda harbour, bears N. $\frac{3}{4}$ E. $5\frac{1}{2}$ miles from Rock Island, and N. by E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles from the Ucona Rocks. It is high, conical, covered with trees, and a cave passes entirely through it.

Buisaco Islet, a quarter of a mile N.N.E. from Centre Island, is about 40 feet high, and covered with trees and shrubs.

Southampton and Supply Rocks.—There are but two hidden dangers in Simoda Harbour; the first is Southampton Rock, which is in mid-channel, S. by E. $\frac{3}{4}$ E., 2 cables from the South point of Centre Island, and N. $\frac{1}{2}$ W. from Vandalia Bluff, about three-fourths of the way between it and Centre Island; it is about 25 feet in diameter, has 2 fathoms water on it, and has been marked by a white spar buoy. The other is the Supply Rock, lying

* The harbour was surveyed in 1854 by the officers under Commodore Perry, U.S.N., and the directions which follow are based upon those drawn up by Lieutenant Wm. L. Maury, U.S.N.

† See Commodore Perry's "Narrative," pages 440, 453, &c.

South by West a short distance from Buisaco or Misana Islet. It is a sharp rock, with 11 feet of water on it, and has been marked by a red spar-buoy.

In the outer road, or mouth of the harbour, a disagreeable swell is sometimes experienced; but inside Southampton Rock and Centre Island, vessels are well sheltered, and the water comparatively smooth. Moor with open hawse to the S.W.

When this harbour was surveyed in 1853-54, the bottom throughout was mud; but a few months subsequently the harbour was scoured out to its granite foundations by the back sweep of three huge waves which in succession rose over the tops of the highest trees, and left the bay nearly empty. Large junks were thrown some distance inland, and the Russian frigate *Diana* left all but a total wreck.* It has never since afforded good holding ground in the event of a storm, but it was always an unsafe and exposed bay when the anchorage ground was tolerable, being open to South and S.S.W., the direction from which the heaviest winds blow.

The town was being rebuilt when it was visited by Captain Sherard Osborn, R.N., four years after, and his "Cruise in Japanese Waters," p. 392, gives a pleasant account of the place.

It is high water, full and change, in Simoda Harbour, at 5^h 0^m; extreme rise of tide, 5 ft. 7 in.; mean rise, 3 ft.

DIRECTIONS.—In navigating the south-eastern coast of Japan, after passing Cape Chichakoff, in Van Diemen Strait, if the weather be thick, the vessel's position should be well ascertained before she is hauled to the E.N.E., as her course is parallel to the high land for about 20 miles from the pitch of the cape. It should also be borne in mind that, as far as our knowledge extends, the current on this coast generally runs to the E.N.E. at the rate of 40 miles a day; it may, however, be entirely checked for twenty-four hours by a N.E. wind, when it may be again expected to resume

* The tremendous convulsion here alluded to is one of the most remarkable on record. Admiral Count Pontiatine has given a brief statement of its effect on the *Diana*. On Dec. 23rd, 1854, at 9^h a.m., without any previous indication, the shock of an earthquake occurred, which lasted two or three minutes, shaking the vessel very much. At 10^h a huge wave entered the bay, and, rushing on the shore, washed nearly every building in Simoda away. A second wave rushed in five minutes afterwards, and at 10^h 1^h a third wave left only sixteen out of one thousand houses standing. From 10^h 3^h till noon the water sunk and rose so extraordinarily that the depth varied from 8 feet to 40 feet depth at her moorings, and she was flung about and turned no less than 43 times round her anchor in thirty minutes. After this the agitation diminished, but continued for some hours. The *Diana* was much injured, and her crew, on January 18th, were compelled to leave her. She was taken in tow by 100 junks to carry her into the bay, but after proceeding a few miles, a small white cloud appeared, on perceiving which the Japanese fled panic stricken, and cast her adrift. In a very short time a violent storm arose, in which she foundered. The waves which were raised reached the Coast of California a few hours after, and were registered then.

its former course, and possibly run with greater rapidity than usual for one or two days.

Vessels, therefore, bound to the eastward must allow for this current, and should keep not more than 30 miles off shore, so as to be enabled, if necessary, to verify their reckoning by sighting the land,* as also to avoid being set to the southward, as is sometimes the case when approaching Cape Idsu, and with light winds it is difficult to regain the coast. In the summer season the north-easterly current is not to be expected in the vicinity of Cape Idsu.

In approaching the Gulf of Yedo, the remarkable high mountain Fusi yama, a lofty and symmetrical truncated cone of ^{12,448}~~44,177~~ feet elevation, and so different in form from any other land in its vicinity, cannot fail to be of great service in directing vessels either to Simoda or Yedo. In clear weather it is the first distant land seen, and generally to the north-eastward, visible at times upwards of 100 miles. Cape Idsu is in line with it when bearing North. When bound from the southward and westward endeavour to make Cape Idsu, and if the weather is at all clear, the chain of islands off the Gulf of Yedo will at the same time be plainly visible. Omae saki, the West point of entrance to Suruga Gulf, cannot be mistaken for Cape Idsu, the former being low, with a sandy beach and low sand hills, with occasional patches of trees, and the coast is said to preserve this character for 30 or 40 miles to the westward; whereas the cape is high and rocky, and its summit generally hidden in the clouds. Rock Island being low, unless the weather is clear, will not be seen until long after this cape and Vries island are made.

If intending to anchor at Simoda, pass Rock Island at a mile, when the harbour will be in full view to the northward. Standing in from this island a vessel will probably pass through a number of tide rips, but no soundings will be obtained with the hand lead until near the entrance, when the depth will be 14 to 27 fathoms. Should the wind be from the northward, and fresh, she should anchor at the mouth of the harbour until it lulls or shifts, or until she can conveniently warp in, as the wind is usually flawy and always baffling.

Approaching from the N.E. or eastward, a vessel can pass on either side of Vries island, from the North and South points of which, Cape Diamond bears respectively W.S.W. and West, distant about 21 miles. Between Vries and Simoda no dangers are known to exist; but the currents are uncertain, and strong near the coast.

* It is recommended to make Siwo misaki, the East point of entrance to the Kii Channel, whenever practicable.

Should Vries be obscured by thick weather, before reaching Cape Diamond* endeavour to sight Rock island, for there are no conspicuous objects on the main land by which a stranger can recognize the harbour at a distance, and the shore appears as one unbroken line. To the westward of the harbour there are several sand beaches, and three or four sand banks; these can be plainly discerned when within 6 or 8 miles, and are good landmarks. Off the village of Susaki, at a third of a mile from the shore, is a ledge of rocks upon which the surf is always breaking. Give them a berth of 2 cables in passing.

Approaching Simoda from the south-east pass westward of Kosu Sima, from which the harbour bears N. by W. $\frac{1}{2}$ W. distant about 27 miles,

From Cape Diamond the eastern coast of the Idsu Peninsula trends to N.N.E. for 20 miles, and then recedes slightly to the westward, forming a bay, at the head of which is *Atami*, a place passed by Sir Rutherford Alcock, in his journey from Yedo to Fusi-yama. At Atami is a hot sulphur spring. From a vent, about six times a day, an immense column of steam and hot water is ejected. These baths are frequented by the Japanese, and there is a small village of 200 or 300 houses. The head of the great bight is formed by low land, and called Odawara Bay. Around the head of this bay the *railroad*, which is proposed to connect Yedo with Oösaka, will pass.

ODAWARA BAY.—Care must be observed when steering for the Uraga Channel not to be drawn into this bay, as a considerable indraught has always been experienced, and the low land at the head of the bay contrasted with the high land to the westward of it, looks so distant, that the bay has often been mistaken for the channel, and the error only discovered when deeply embayed, and probably close to some of the reefs which skirt the head and East side of the bay, the most dangerous of which is the Macedonia Reef.

This indraught considerably increases the difficulties experienced by a sailing ship in extricating herself from the dangers on the East side of the bay with a southerly wind, especially should it fall light.

Ino Sima, 220 feet high, is the eastern extreme of the low shore fronting the plain at the head of Odawara Bay, which is said to be very shallow, although there are 56 fathoms at 4 miles distance. A large reef, marked by a peaked rock, 30 feet high, was seen breaking heavily off the beach, 2 miles to the West of Ino sima. Ino sima has bold high cliffs of a light colour, which makes it very conspicuous, and a flattish summit with a few large trees. On the S.E. it cannot be approached within three-quarters of a mile, as an extensive reef skirts that part of the island. The island is

* Commander C. Bullock, R.N., observed, October 6th, 1866, some submarine jets, apparently of steam, about 10 miles N.E. of Cape Diamond, and 2 miles off the land.

connected with the main, where the Sagami hills terminate, by a narrow ridge of shingle, which covers at high water, to the westward of which a small river disembogues. There is generally a heavy ground swell at this part of the bay.

The white pointed cliffs of Kotzomura will be seen $2\frac{1}{2}$ miles East of Ino sima (the coast between being skirted by sunken reefs), and are a guide to the only anchorage on the North side of Odawara Bay.

Horino-utsi-mura Bay.—The bay directly East of the white cliffs is full of reefs, and cannot be approached, but Horino-utsi-mura Bay, the bay next S.E., and to the North of Imperieuse Bluff, is a fair temporary anchorage, though exposed to W. and S.W. winds.

A reef, 3 cables long, extends from a low point at the foot of Imperieuse Bluff. To the N.W. of this, a chain of rocks runs out westward from the low point just North of the bluff; the centre part of these is marked by a large white-topped rock, 20 feet high; the outer rock is very small, but uncovered. At 3 or 4 cables North of this chain there is anchorage in 4 to 8 fathoms. The *Dove* and *Leven* anchored here, the line of rocks quite breaking the heavy swell from the South.

Macedonian Reef lies off the East side of Odawara Bay, at 4 miles N.N.W. of the lighthouse on the West end of Joka sima. It dries in many places at low tide, and, except in the smoothest water, always betrays itself by a breaker when covered, and is therefore easily avoided in day-time; but if it be not visible, do not bring the lighthouse to the southward of S.S.E. $\frac{1}{2}$ E. until the South end of the first range of hills, 700 feet high, North of Cape Sagami, bears E. $\frac{1}{2}$ N. The ranges of Sagami peninsula terminate in Imperieuse Bluff, 500 feet high, wooded, and very conspicuous. By keeping the West slope of the bluff N. by E. a vessel will pass three-quarters of a mile outside the reef in 30 fathoms.

ASINA BAY.—Vessels embarrassed in the vicinity of the Macedonian Reef may find an anchorage about $1\frac{1}{2}$ mile N.E. of it in Asina Bay, in 4 to 8 fathoms, good holding-ground, and sheltered from all points except westward, in which direction the sea has a clear fetch of 20 miles; but only a case of extreme emergency would justify a stranger using it. There are some rocks off the North side of the bay, but they show, and are easily avoided by keeping mid-channel.

Ko-adjiro Bay.—There are two or three excellent havens for small craft and junks on the West shore of Sangami peninsula, to the southward of the Macedonian Reef. Ko-adjiro, the largest of these, is 2 miles North of Joka sima lighthouse, or three-quarters of a mile N.E. of the Moroisi, a long reef of rocks, which extend off the point N. by W. $\frac{1}{2}$ W. of the lighthouse. There is no difficulty in entering. There is a reef off the North point of entrance which, with only 1 fathom water on it, stretches half across the entrance, with a 4-fathoms channel on the bold South shore. Further in a

perch marks the end of the shoal from the South shore. Inside this is secure anchorage for a small vessel in 3 fathoms.

SU SAKI, on the East side of the entrance of the Gulf of Yedo, when seen from the southward appears as a block of small hills, rather conical in profile, the highest, *Hazama*, being elevated 650 feet. The point is low, with the exception of a small elevation, at the N.W. corner, on which is an old fort. There is a heavy tide rip off it, but no dangers at a greater distance than half a mile from the shore, and the point may be safely rounded at a mile.

NOSIMA POINT and LIGHT.—The southern extremity of the eastern promontory of Yedo Gulf is Nosima. To the West of it is *Mela Point*, from which the dangerous *Mela Ledge* extends for $1\frac{1}{2}$ mile, and beyond this is a rocky bank, stretching 3 miles further. Over these a heavy sea rolls at times.

The Lighthouse is deserving of especial notice, as being one of the first of its kind erected on European principles in Japan, the other being on the opposite point of Kanon-saki. It is an octagonal white tower, which shows a brilliant *fixed* light, from a first-order lens apparatus, elevated 134 ft. above high water, and visible 20 miles off.

TATIYAMA BAY.—The coast from Su saki doubles back abruptly to the eastward 4 or 5 miles before taking its northerly trend, forming, with Daibo saki, the point next North of Su saki, the Bay of Tatiyama, in which shelter and good holding-ground may be found in southerly and easterly gales, but it is quite exposed to the westward.

The best position to anchor is in about 7 fathoms, a quarter of a mile eastward of Taka sima, the easternmost of the two small but well wooded islands on the South side of the bay, with the West extreme of Daibo saki N.N.W. $\frac{1}{2}$ W., and Siro yama, a hill 290 feet high, S.S.E. $\frac{1}{2}$ E. This hill is remarkable from having a clump on it, and being the North extreme of some rising ground in the S.E. corner of the bay. This position is well sheltered from North round East to W. by S., but should there be any appearance of the wind veering westward, an early departure is recommended, as a heavy sea quickly tumbles in.

The *Acteon* obtained fish and fowls in small quantities. Water was brought off in boats by the villagers residing at a hamlet situated at the base of Siro yama.

URAGA CHANNEL, connecting the gulf with the bay of Yedo, appears remarkably clear of hidden danger. On its West side are the *Plymouth Rocks*, which are always uncovered and easily seen. There are some sunken rocks close around them.* A shoal of 2 fathoms water is said to lie at a

* *Uraga* or *Reception Bay*, on the western side of the entrance, within the Plymouth Rocks, is remarkable as the place where the American squadron first had communica-

little more than half a mile southward of these rocks, but its position and existence are doubtful. The mariner, however, should bear this in mind, and, as Kaneda Bay has also some foul ground in it at nearly a mile from the shore, it would be prudent to give this locality a good berth in passing.

The only hidden danger known is the *Elmstone Rock*, named after the master of the merchant vessel who first reported its existence. It was examined by Commander H. A. Reilly, H.M.S. *Pioneer*, who found only 10 ft. on it, from which the East extreme of Kanon saki bore N. by E. $\frac{1}{2}$ E., the South extreme of the northern shore of Uraga Cove W. $\frac{1}{2}$ N., and the Plymouth Rocks S. by W. A vessel will pass half a mile eastward of it by not bringing the Plymouth Rocks southward of S.S.W. $\frac{1}{2}$ W., until Kanon saki lighthouse bears N.N.W.

Light.—A light has always been found on the West end of Joka sima, the small narrow island lying off Sakura Point, at $3\frac{1}{2}$ miles westward of Cape Sagami. Under the most favourable circumstances it may be visible from 10 to 15 miles, but being simply a wood fire in an open shed, too much confidence as to distance should not be placed upon it.

YEDO BAY is about 28 miles deep in a N.E. direction, 20 miles wide at its broadest part, with excellent holding-ground, and capable of sheltering the fleets of the world. No danger of any description has been found in it, except the margin of the bank of fine sand which skirts its shores, and which, in some parts at the head of the bay, extends off $3\frac{1}{2}$ miles from high water mark, and off Beacon Point on the western shore it is very steep-to; a careful lead, however, will give ample warning. The *Saratoga Spit*, extending from the eastern shore is, however, dangerous, and great caution is necessary when passing it. This spit is the termination of Futau saki, a low sandy point, on which are three forts and a fishing village. Its South side has not been yet properly sounded, and it may possibly be steeper to the bank on that side than the other. There is chow-chow water off its extreme end, generally in the deep water.

KANON SAKI Light.—The West point of the entrance to Yedo Bay is Kanon saki. On it is a square stone tower attached to the light-keeper's dwelling, which shows a bright *fixed light* from a fourth-order lens apparatus. It is elevated 170 feet, and may be seen 14 miles off. It is visible between the bearings of S. 30° W. to N. 28° W. by the East. The Plymouth Rocks bear S. by W. $\frac{1}{2}$ W.

The principal anchorages in Yedo Bay are on its western shore. *Susquehanna Bay*, at 3 miles W.N.W. of Kanon saki, is well sheltered, but as it contains a number of reefs and rocks, it cannot be recommended. *Powhattan*

tion with the envoys of the Japanese emperor, July 14, 1853, which led to the treaties opening the country to foreign commerce. See Narrative of the American Squadron, under Commodore M. C. Perry, U.S.N., 1866, pp. 266—303.

Bay, at $5\frac{1}{2}$ miles N.W. by W. of Kanon saki, has good anchorage in 6 to 7 fathoms, and near it are two snug coves in which vessels may conveniently repair and refit. *American Anchorage* has depths of 8 to 10 fathoms, with Perry Island bearing S.S.E., and Webster Island S.W. by S. Both these islands are wooded.

Mississippi Bay, at 4 miles northward of American Anchorage, is well sheltered from the prevailing winds. In anchoring give the shore a wide berth to avoid a shoal which extends half to three-quarters of a mile from it. Between American Anchorage and Treaty Point the soundings are irregular, shoaling suddenly from 12 to 5 fathoms on banks of hard sand.

YOKOHAMA.—Yokohama Bay is situated to the northward of the ridge of low hills seen extending into the bay of Yedo, at $10\frac{1}{2}$ miles N.N.W. of Kanon saki. This ridge terminates at the sea in a line of bluffs, $1\frac{1}{2}$ mile in length, from 100 to 120 feet in height, and quite abrupt to the sea, of which the southern, Treaty Point, is of a conspicuous yellow colour, and the eastern, Mandarin Bluff, has received the name of Haycock from its shape. These bluffs, and a bank which fronts them to the distance of three-quarters of a mile, and which is rather steep-to, protects the anchorage from south-westerly winds, the only ones which send any sea into the bay.

The *Lightvessel* is moored (1870) at the extremity of the shoal water. She has two masts, with a ball at the foremost head. She shows a *fixed red* light at 36 feet. From the lightvessel Treaty Point bears S.W. $\frac{3}{4}$ S., Mandarin Bluff, S.W. by W., and the Mouth of the Canal W. $\frac{1}{4}$ N.

An *iron buoy*, with a cage, has been moored (in 1869) in 4 fathoms on the northern extreme of the shallow water to the southward of Yokohama anchorage, with Mandarin Bluff bearing S. by E. $\frac{1}{4}$ E.; Mouth of the canal S.W. by S. $\frac{1}{4}$ S.; Centre of the English Hotaba W. by S.

The best anchorage is off the town in 4 to 6 fathoms, over sandy bottom, with Mandarin Bluff bearing S.S.E., and the landing jetties W.S.W. Vessels of light draught may, if desirable, take a berth nearer the town.

KANAGAWA.—At the head of the bay, and on its North side, stands the town of Kanagawa, one of the ports opened by treaty to foreigners; but this has been changed by general consent to Yokohama on the South side, owing to its more eligible position for business and communication; the water also is deeper for anchorage and more convenient for the landing of boats and merchandise than at Kanagawa, where it is so shallow that at low tide the sea retreats a considerable distance from the shore.

Kanagawa is subject to frequent shocks of earthquakes. It is situated on the Tokaido or imperial highway to Yedo. British subjects are free to go where they please within the following limits—from Kanagawa, 10 *ri* (20 miles) in any direction except towards Yedo, the boundary in that direction

North Pacific.

being the River Logo, which empties into the bay of Yedo between Kawa saki and Sinagawa, the southern suburb.

Yokohama is on a plain surrounded by low hills, and is environed by a canal which entirely isolates it. The only communications are by a bridge and causeway towards Kanagawa from the rear of the town on the West, and with the Yokohama Bluffs by another bridge close to the sea. The residences of the foreign community occupy the East, and those of the Japanese merchants the West of the town. Two stone piers, the ends of which are protected by a pallisade of wooden piles to break the sea, afford excellent landing.

All supplies, provisions, water, coal, &c., are to be procured in abundance.

Tides.—It is high water, full and change, in Yokohama Bay at 6^h, and springs rise 6½ feet, neaps 4½ feet. With southerly winds the tide rises about 2 feet higher.

The streams in this bay are scarcely felt, but they run strong in the middle of Yedo Bay, and their velocity is much increased off Saratoga Spit, Perry Island, and Kanon saki, particularly off the latter, round which they sweep with great rapidity.

YEDO is situated in the north-western corner of Yedo Bay, along the shore of which it extends, with its suburbs, for 8 miles. Its aspect is not imposing, as large stacks of timber and elevated ground conceal by far the larger part of the city. Five batteries also interpose between the anchorage and the city. These, with several others on the shore, have green turfed parapets and escarps faced with stone, and are surrounded by a piling of timber, which is covered at high water. The suburb of Sinagawa stands on the South of the city, where are seen the low wooded heights of Goten yama, 2 miles in extent, along the shore. The landing-place is on the North side of these, and West of the five forts, close to which is the temple occupied by the British legation.

This bay is so shoal all along the shore where the city stands, that at low water even a ship's boat cannot approach within a mile. The best anchorage for a large ship is in 5 to 6 fathoms, soft mud, good holding-ground, with the south-western of the five forts bearing N.W.; but recollect that on this bearing the water shoals rather suddenly from 4 to 2½ fathoms. It is better, therefore, to anchor a smaller vessel on a N.W. by N. bearing of the fort. H.M.S. *Furious*, in 1858, anchored in 15 ft. at low water, with the five forts bearing from N. ¼ W. to N.W., Beacon-house S. ¼ W., and the peak of Fusi yama W. ¼ N.

DIRECTIONS.—Approaching the Gulf of Yedo from the southward or westward, in clear weather, the chain of islands running southward from it are unmistakable landmarks, and Cape Idsu can scarcely be mistaken. Omae saki, the point 25 miles westward of the cape, is low, while the cape, as before stated, is high, bold, and rocky. From 1½ mile eastward of Rock

Island a N.E. $\frac{1}{2}$ E. course will lead 4 miles north-west of Vries Island, from which position the centre of the entrance of the Uraga Channel bears N.E. by E., distant 22 miles. Care, must, however, be observed when approaching Cape Sagami not to be drawn into Odawara Bay by the draught mentioned in page 637. Should Vries Island be visible this danger is easily guarded against by not bringing that island southward of S.W. by S.

Vessels approaching the gulf from the eastward are recommended not to hug the shore of the South end of Awa too closely, as dangerous shoals are known to exist in that neighbourhood. By night the fine dioptric light on No sima will be an efficient guide, but care must be taken of the extremely dangerous ledge (Mela Ledge), which lies $1\frac{1}{2}$ mile off No sima and Mela Head, about 5 miles S.E. of Su saki. Extending 3 miles from this ledge in a S.W. direction is a rocky bank in the form of a tongue, with 30 fathoms on its outer extreme, gradually shoaling to the ledge. These dangers are steep-to (40 fathoms) on their South side. Heavy breakers occur in rough weather, or when a swell rolls home, but in smooth water the rocks are not seen from a distance; the water, however, is so clear, that the bottom is visible in a considerable depth.

To avoid the Mela Ledge, and all other *known* danger, when rounding from the eastward, do not bring the eastern extreme of land *seen* to bear eastward of E.N.E. until the extreme of Su saki bears N. by W.; and when rounding from the westward do not bring the extreme of Su saki westward of N. by W. until the eastern extreme of land is E.N.E. At night, should the light not be seen in thick weather, soundings of 40 fathoms may be considered as indicating close proximity to these dangers.

In steering for the Uraga Channel, the Tree saddle hill on the South end of Sagami peninsula will be readily recognized; and on nearing the channel the two small *Plymouth Rocks* and a *beacon** on them will be plainly seen on its western side. Give these rocks and the Elmstone Rock a berth of half a mile in passing, and after rounding Kanon saki at the same distance steer N.N.W., which will lead between the Saratoga Spit and some broken ground off the small woody island Sului sima (Perry Island). Continue this course until abreast Graham Bluff, at the South side of Mississippi Bay. From this position the elevated ground about Mandarin Bluff, at 1 mile northward of Treaty Point, showing to seaward in brown cliffs well wooded to the summit, will be readily recognized, the bluff being the most eastern.

* The *beacon* is made of iron, and surmounted by a spherical red painted cage, the top of which stands about 23 feet above high-water level. It lies in 2 feet water at low tide, and is distant 1 cable from the two Plymouth Rocks that stand above water. Kanon Point Lighthouse bears from it N. $7^{\circ} 45'$ E.; the middle of Uki Island, S. $32^{\circ} 30'$ E.; and Kanaya Point, S. $50^{\circ} 30'$ E.

Alter course now to North, and use a careful lead, not shoaling to less than 7 fathoms when rounding Treaty Point and Mandarin Bluff, neither of which should be approached to a less distance than a mile. But the extent of the shoal water is clearly shown by the light-vessel. The lead will still continue a good guide, the depths gradually decreasing as the anchorage is approached.

A sailing ship will have to make short tacks when working into Yokohama Bay with a westerly wind, as North of Mandarin Bluff the deep-water channel is narrowed to $1\frac{1}{2}$ mile; the lead here, however, as is the case round nearly the whole shores of Yedo Bay, gives fair warning.

If proceeding from Yokohama to Yedo, stand out E. by N. till the house in the tree clump (of which the roof only is generally seen) of Kawa saki or Beacon Point bears N.N.E., when haul up N.E. or N.E. $\frac{1}{2}$ E. along the shore which is skirted by a shallow shelf a mile broad, and very steep at the edge, on which three beacons or large posts will be seen, taking care not to decrease the soundings under 9 fathoms till the tree clump or house bears W. by N. Then haul up N. by E. if in soundings under 8 fathoms, or North if over 8 fathoms, and anchor in 6 fathoms with the southern part of the wooded heights of Gotenyama bearing West, and the southern of the five forts N.W.; or steer in upon the latter bearing, and anchor in any convenient depth, as above.

Working through the Uraga Channel.—With a northerly wind a vessel, after passing Cape Sagami, may stand across and tack close to the opposite shore, as there are no rocks at any distance off it to the northward of Kanaya Point, and to the southward of the point the dangers show. If unable to fetch this point, it would not be prudent to stand into the bay between the point and Uki sima, a small rocky island 150 feet high to the southward, as foul ground exists there. This bay will be readily recognized from a distance, as it is the sea-shore of a valley between the Miogani yama and Sveno yama ranges, and two small hills are in the centre of it.

In making the western board, the doubtful shoal South of the Plymouth Rocks, must be remembered (page 639), as well as the foul ground in Kaneda bay. The shore of Kadsusa Bay, northward of the Miogani yama range, may be approached by the lead, tacking in 5 fathoms.

If unable to fetch Kanon saki on the starboard board, be careful to tack short of the bearing for clearing the Elmstone Rock, page 640. Short tacks should be made when to windward of Kanon saki, not shoaling towards the opposite or Kadsusa shore to less than 9 fathoms, as the South side of the Saratoga Spit has not been sounded. When Perry Island (Sului sima) bears W. by S., stand no further eastward than to bring Kanon saki to bear South, until Perry Island is S.W. $\frac{1}{2}$ W., when the spit will have been weathered. Long boards may now be again made, but do not shoal on either tack to less than 5 fathoms, nor off Yokohama Bluff to less than 7 fathoms. There are

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some shoal patches of $3\frac{1}{2}$ to 5 fathoms, sand and mud, off the western side of the bay between Perry Island and Mississippi Bay, but none are known at a greater distance off than 2 miles, and they may be avoided by not bringing Perry Island eastward of South.

EAST COAST OF NIPON.

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Vessels bound from the Gulf of Yedo to the eastern entrance of the strait of Tsugar, will, after passing Su saki and Cape King (Eratatsi) experience the full force of the current setting them to the E.N.E. The land about Cape King is high and wooded; the coast in its locality should be given a good berth, as heavy breakers were seen some distance off shore.

Caution is requisite in doubling Cape Blanco, a bold chalky bluff, as the American squadron passed over the edge of a reef in 22 fathoms water S.S.E., distant about 5 miles from this cape, and from the heavy overfalls, in which fishing-boats were anchored, there must be much less water upon its shoalest part. As it was near nightfall it was impossible to examine this reef, but its position is about lat. $35^{\circ} 8' N.$, long. $140^{\circ} 34' E.$, and Cape Blanco in lat. $35^{\circ} 13' N.$, long. $140^{\circ} 32\frac{1}{2}' E.$ *

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From this cape to Tsugar Strait no dangers were seen,† nor did the squadron approach the coast sufficiently near to test the accuracy of the charts, until arriving off Cape Nambu, the N.E. point of Nipon. From the northward and eastward, at the distance of 6 or 8 miles, the outline of this point resembles the back of a sperm whale, with its head to the southward, the Dodo Rocks, off the point, forming the flukes. On nearing the entrance of the strait, the water thermometer suddenly fell 15° or 20° , as the squadron ran from the north-easterly current into the cold current setting through the strait. From Cape Nambu a N.W. by W. course made good will lead to Hakodate Head (page 647).

THE STRAIT OF TSUGAR.

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ground in Kaneda
ogani yama range,

The **STRAIT** of **TSUGAR** (or *Sangar*), separating Nipon from Yezo Island, is about 40 miles in length in an E.N.E. and W.S.W. direction, and $9\frac{1}{2}$ miles wide at its narrowest part. The following description is by John Richards, Master Commanding H.M.S. *Saracen*, who surveyed the strait in 1855:—

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* These positions are doubtful, as the unfavourable weather prevented observations near them. They are probably 6 or 8 miles too far eastward.

† The Russian frigate *Arkold* reports the existence of a reef in lat. $36^{\circ} 15' N.$, long. $141^{\circ} 28' E.$; but this position must be considered as doubtful, as the vessel had no observations for two days previous to seeing the reef. The *Highflyer* passed within a mile of it on an unusually bright moonlight night, and saw nothing.—Edward H. Hills, Master R.N., H.M.S. *Highflyer*, 1869.

CAPE GAMALEY or *Yokoiso*, near the N.W. point of Nipon.—Approaching the western entrance of Tsugar Strait from the S.W., the Bittern Rocks, described hereafter, will be seen lying W. by S. about 16 miles from Gamaley. The land about this cape is moderately elevated and level. The coast between it and Oho saki, to the northward, is low and sandy. Between Sasagota Bay and Oho saki the coast is safe of approach, having regular soundings, and fair anchorage in N.E. winds.

Oho Saki or **Cape Greig**, is remarkable from its peculiar form, and being the commencement of the high land extending to *Tatsupi saki*, which bears from it N.N.W. $\frac{3}{4}$ W., $8\frac{1}{2}$ miles. The bay between these points, although containing much foul ground, may be useful to a vessel not able to get through the strait during an easterly gale. The bottom of the bay is very foul.

TATSUPI SAKI or **Cape Tsugar**, the South point of western entrance to Tsugar Strait, is a bluff, 362 feet high, from whence the land rises to the height of 2,200 feet, at the distance of 4 miles inland. A large rock, 300 ft. high, lies 2 cables N.E. of the cape, and is connected to it by a low neck of sand and stones. On a N.W. and S.E. bearing this rock makes like an island. The cape is steep-to, but the strong eddies near it make it prudent not to approach it nearer than a mile.

Gun Cliff, at $9\frac{1}{2}$ miles E. by S. $\frac{1}{4}$ S. from Tatsupi saki, is steep-to, and has a battery of six guns on its apex, which is 200 feet high. In the bay between these points, off the town of *Memoyah*, about half a mile from the shore, there is capital anchorage in 8 fathoms, indeed the best in the strait next to Hakodadi.

From the South point of this coast a steep cliffy shore, with deep water close to, trends 25 miles to the northward, nearly in a straight line to *Toriwi saki*. The cliffs are coloured with the most brilliant and varied tints, and, like the entire coasts of the strait, are of basaltic formation. Among the most remarkable are the *Red Cliffs*, rising to the height of 1,600 feet, at 17 miles southward of *Toriwi saki*. At 9 miles further to the northward are two remarkable pointed cliffs, named *Double Head*. Nearly 2 miles to the S.W. of this head is a rock 42 feet high; and North about 3 cables from this is a rock awash at low water.

TORIWI SAKI, the northern point of Nipon, is a low tapering point, off which, at the distance of a cable, is *Low Islet* or *Omaski sima*, 40 feet high. The ground all around this cape and islet is very foul.* There is a tide

* It was stated that the anchorage (which was recommended) to the N.E. of the cape was clear of rocks, but the P. and O. Company's steam-ship *Singapore*, on her voyage from Yokohama to Hakodadi, on the 20th September, 1867, struck on a rock, off *Toriwi saki*. This rock, named the *Singapore Rock*, is said to lie N. by E. $\frac{1}{4}$ E., distant $2\frac{1}{2}$ miles from Low Island, or 3 miles N. by E. from *Toriwi saki*.

race, near the full and change of the moon, 3 miles North of Low Islet, and heavy overfalls with a N.E. swell.

SIRIYA SAKI or **Cape Nambu**.—From Low Islet the coast to the eastward is foul for about 3 miles, after which it may be approached without fear. At 10½ miles from Low Islet is a remarkable red cliff, which shows well to the westward; and at 2 miles westward of this cliff is a high sharp bluff, and a high round bluff 2 miles to the eastward.

From the latter bluff the coast is low to within 4 miles of Siriya saki, or Cape Nambu, where it rises to 1,265 feet, and descends again towards the cape in a gentle slope, making at a distance like an island. There is good anchorage in the deep bay between this cape and the red cliff, but the best is on its western side, abreast the coast-line where the high and low land meet, in 15 fathoms. Off the cape, at the distance of 3 cables, is a small white rock 70 feet high. There is also another rock, rather larger, lying a cable off shore, at 2 miles S.W. of the cape.

The *Rattler Rock*.—Comm. J. W. Webb, of H.M.S. *Rattler*, discovered a dangerous rock, awash at low water, which lies E. by N., distant three-quarters of a mile from the white islet or rock North of Siriya saki or Cape Nambu, the N.E. point of Nipon.

CAPE YESAN or **Esarmi**, on the South coast of Yeso, is the North point of eastern entrance to Tsugar Strait, and the East extreme of a bold promontory, with several remarkable dome-shaped mountains in the rear. The cape itself is a steep cliff, about 600 feet high; the volcano immediately above it is 1,935 feet high, and frequently capped with a light cloud of steam, but not otherwise active.

At 8½ miles S.W. by W. of Cape Yesan is *Conical Islet*, 200 ft. high, lying close to the coast. There is a dangerous low point 1 mile to the westward; and at 2½ miles to the eastward is Foul Point, which is low, and has a dangerous reef extending 2 cables from it.

CAPE SIWOKUBI or **Blunt**, bears W. ½ S. 2½ miles from Conical Islet, E. by S. 12 miles from Hakodadi Head, and N. by E. ½ E. 9½ miles from Low Islet, which is the narrowest part of the strait. This cape is steep-to, and the N.E. current frequently runs with greater strength close to the rocks than out in the stream. The summit of the bluff immediately above the cape is 1,022 feet high; from thence the high land ranges in towards the Saddle Mountain. The coast for about 7 miles to the westward is a level plain of an average elevation of 200 or 300 feet; beyond 7 miles, it descends to the low beach connecting the high land of Hakodate Head with the main.

HAKODATE HEAD is the South extreme of a bold peaked promontory, 1,136 ft. high, standing well out from the high land of the main, with which it is connected by a low sandy isthmus. The head is steep and precipitous, and safe of approach. At 4½ miles West of the head is *Mussell Point*, off

which a reef extends 2 cables, and is steep-to. The coast from thence to Cape Saraki, at $4\frac{1}{2}$ miles to the S.W., is level, but fringed with rocks, and requires caution in approaching. To the westward of the cape the shore is low, with a sandy beach safe of approach, and clean ground for anchorage to within 3 miles of Cape Tsiuka.

HAKODATE or HAKODADI HARBOUR.—The port of Hakodate or Hakodadi, on the North side of Tsugar Strait, is situated at the foot of the northern slope of a high peninsula, which is connected with the mainland of Yeso by a low sandy isthmus. It is an excellent roadstead, 4 miles wide and 5 miles deep, and, for accessibility and safety, is one of the finest in the world. Its entrance is between Hakodate Head and Mussell Point, which bear East and West of each other, distant $4\frac{1}{2}$ miles. The harbour is in the south-eastern arm of the bay, and is completely sheltered.

This excellent port is one thrown open to American commerce by the treaty procured by Commodore Perry, U.S.N., March 31, 1854. The town lies on the southern coast of the Island of Yeso, on the western side of a small peninsula which forms one side of the harbour. The appearance of the place is striking and picturesque, and in its position, general aspect, and many particulars, resembles Gibraltar.* The town, containing 1,000 houses, and from 6,000 to 8,000 inhabitants, stretches for about 3 miles along the base of a lofty promontory, divided into three principal peaks of from 600 to 1,000 feet in height, whose bare summits are often covered with snow. An excellent road connects it with Matsmai. The inhabitants are chiefly engaged in commerce and the fisheries, and carry on a large trade with the interior.†

* The town contains over a thousand houses, which mostly stretch along in one main thoroughfare near the seaside, while the remainder, forming two or three parallel streets, hang upon the ascent of the hill in the rear. Every one on board the ships who had visited Gibraltar was struck with the resemblance of Hakodadi, from its position and general aspect, to that famous fortified town. There was the isolated hill, on the base and acclivity of which the houses were built, corresponding to the rock of Gibraltar; there was the low neck of land reaching to the elevated region beyond, like the neutral ground which separates the English fortress from the Spanish territory, and a receding country and capacious bay surrounding Hakodadi, as well as Gibraltar, to strengthen the resemblance between the two. Moreover, the position of the Japanese town on the Strait of Tsugar (Sangar), with the high land of Nipon and its towns of Say and Mimaga at the South, like that of Gibraltar, overlooking the narrow channel which connects the Atlantic and Mediterranean, and commands the opposite and elevated coast of Africa, with the towns of Tangier and Ceuta clothing its heights, served to confirm the similarity of features with which every one whose travelled experience allowed of comparison was greatly impressed. —(U.S. Japan Expedition, p. 506.)

† Hakodate belongs to the Imperial fief of Matsmai, and, with the exception of that town, is the largest on the island. It is 30 miles East of Matsmai, and they are connected by an excellent road.

More than a thousand junks are occasionally seen at one time at anchor in the harbour.

Supplies.—Water can be easily obtained from Kamida Creek, which enters the harbour to the northward and eastward of the town, but the operation is attended with danger to the boats, which have to be dragged over the bar of the river. The Japanese supply fresh water in their own boats at a very moderate rate. A supply of wood and water may also be ordered through the Custom-house, at the bazaar, or from the American agents residing at Hakodate.

The seine supplied the American squadron in 1854 with fine salmon and a quantity of other fish, and the shores of the bay abound with excellent shell-fish. Beef, potatoes, sweet potatoes, fowls and eggs, and all necessaries can be procured. For large supplies of provisions, masters of ships should have recourse to the American agents. Vessels, even when seriously damaged, can undergo repairs in the harbour, there being no scarcity of materials for this purpose. Timber of any dimensions can be procured, though not in great quantity; its price is very moderate. Expert and intelligent Japanese carpenters and efficient blacksmiths are also procurable. There is no want of coopers, but, owing to the scarcity of iron, they use bamboo for hoops.

There is a brass and iron foundry, though worked on a limited scale. No copper sheathing can be obtained; the native sheet copper is very thin and small in size. Ships' boats can be repaired or constructed by the Japanese in a very skilful manner from drawings.

Merchant vessels entering the port are subject to the Custom-house regulations. Coal, of very inferior quality, is also procurable.

Pilots.—Vessels entering the bay are boarded by pilots who charge five Mexican dollars, without any distinction as to the size of the ship. There are no special harbour regulations.

TIDES.—It is high water, full and change, in this harbour at 5^h 0^m, and the extreme rise and fall of tide is 3 feet.

Lightvessel.—Since October, 1865, a lightship has been moored in Hakodate. The vessel exhibits a *fixed* white light. Elevation, 21 feet above the sea; and visible 5 miles. She has one mast, carries a red ball during the day, and is moored in 6 fathoms water at the extremity of the bank, extending in a northerly direction from the peninsula of Hakodate.

The approximate position is lat. 41° 47' 30" N., long. 140° 44' 39" E. of Greenwich.

Approaching from the eastward, after passing Cape Suwo Kubi, named by the Americans Cape Blunt, which is a conspicuous headland 12 miles E.S.E. $\frac{1}{2}$ E. from the town, the junks at anchor in the harbour will be visible over the low isthmus.

Rounding the promontory of Hakodate, and giving it a berth of a mile,

to avoid the calms under the high land, steer for the sharp peak of Komagadaki, bearing about North, until the East peak of the Saddle, bearing about N.E. by N., opens to the westward of the round knob on the side of the mountain; then haul up to the northward and eastward, keeping them open until the centre of the sand-hills on the isthmus bears S.E. by E. $\frac{1}{2}$ E. (these may be recognized by the dark knolls upon them.) This will clear the spit which makes out from the western point of the town in a north-northwesterly direction two-thirds of a mile; * then bring the sand-hills a point on the port bow, and stand in until the western point of the town bears S.W. $\frac{1}{2}$ W., when you will have the best berth, with $5\frac{1}{2}$ or 6 fathoms water. If it is desirable to get nearer in, haul up a little to the eastward of South for the low rocky peak, which will be just visible over the sloping ridge to the southward and eastward of the town. A vessel of moderate draught may approach within a quarter of a mile of Tauki Point, where there is a building-yard for junks. This portion of the harbour, however, is generally crowded with vessels of this description; and unless the want of repairs, or some other cause, renders a close berth necessary, it is better to remain outside.

If the peak or saddle is obscured by clouds or fogs, after doubling the promontory, steer N.N.E., until the sand-hills are brought upon the bearing above given, when proceed as there directed.

A short distance from the tail of the spit is a detached sand-bank, with $3\frac{1}{2}$ fathoms on it, the outer edge of which is marked by a white spar-buoy. Between this and the spit there is a narrow channel with 4 and 5 fathoms water. Vessels may pass on either side of the buoy, but it is most prudent to go to the northward of it.

Should the wind fail before reaching the harbour, there is a good anchorage in the outer roads, in from 25 to 10 fathoms.

At night, many captains of vessels are in favour of a northerly course being steered on entering Hakodate Bay to a depth of 7 fathoms, and keeping in that depth on an easterly and south-easterly course, by which means the spit will be safely rounded.

* These directions were drawn up, of course, before the *lightvessel*, at the North end of the spit, was established. However, should she not be on her station, the following notes will be useful. The north-east end of the fir-trees in line with the Joss-house clears the eastern side in 5 fathoms water; and the foot of the hill in line with the middle of the sandy point leads along the northern side of the shoal.—Captain K. Stewart, H.M.S. *Nankin*, 1855.

If these leading marks should be in the clouds, as they generally are, keep the western extreme of the promontory of Hakodate bearing South or S. $\frac{1}{2}$ W., which will clear the spit, and haul to the eastward when the centre of the sand-hills on the isthmus bears S.E. by E. $\frac{1}{2}$ E.—Commodore the Hon. C. Elliot, H.M.S. *Sybilite*, 1855.

CAPE TSUIKA, at 11 miles S.S.W. of Cape Saraki, is a high cliffy point, which may be further known by three rocks extending a quarter of a mile from a point 1 mile north-eastward of it. The outer rock of the three is of a conical form and 70 feet high. The land to the westward for 4 miles is high and cliffy; about half way between the cape and the end of the cliffs there are two waterfalls.

Vessels can anchor in the bight of the bay, between Capes Tsiuka and Sirakami; but as a southerly wind on the western tide sends in a cross swell, it would not be prudent to anchor far in. The position is in 15 to 20 fathoms, with the southern white cliff bearing West about a mile.

CAPE SIRAKAMI or **Nadieja**, the North point of western entrance to Tsugar Strait, is a high bluff, similar to Cape Siwokubi, but not so safe of approach. The coast, for more than a mile on each side of the cape, is bordered with numerous rocks, generally above water, some of which run off nearly 2 cables. As it is not known whether the dangers extend under water beyond this distance, it will be prudent to give the cape a good berth in passing.

From Cape Sirakami the coast trends W. by N. $\frac{1}{2}$ N. 5 miles to Cape Matsumae, which is low, and off it is a conical islet, with a small temple or building on it. The bay between is very rocky, excepting off the East end of the city of Matsumae, where there is good anchorage in 12 fathoms at half a mile off shore; but this anchorage would, of course, be unsafe in southerly winds.

Currents and Tides.—During the survey of Tsugar Strait by the *Saracen*, in June, July, and August, 1855, a constant N.E. current set through the middle of the strait, the breadth of which varied considerably according to the state of the wind and weather. Before and during a N.E. wind its strength was much diminished; but with the wind from the opposite direction, it would expand and fill up two-thirds of the channel against the strength of the western tide.

The tide in the stream ran about 12 hours each way near the full and change of the moon, and there were only two regular tides by the shore in 24 hours. At full and change, the flood or eastern stream made at Tatsupisaki at 6^h 30^m a.m., at 7^h at Cape Tsiuka, and at 7^h 30^m at Toriwi saki. The western stream began about 12 hours later. The turn of the stream takes place 1 $\frac{1}{2}$ hour later every day nearly.

C. Pemberton Hodgson, Esq., H.M. Consul at Hakodate, who interested himself to collect information on the subject, writes:—"The tides set with terrific force from the Pacific and Japan Sea; coming from the S.E. and E.S.E. on the one side, and from the West, S.W., and N.W. on the other, they meet in the very middle of the strait. From any high land an observer may see such fearful concussions of the two tides, each running from 3 to 5 miles an hour, and such heavy breaking overfalls, that he may wonder how

a ship can, even with a fair wind, face them; and with comparative alarm, how, with a contrary wind, a vessel can beat against them."

KO SIMA lies W. $\frac{1}{2}$ S. 16 $\frac{1}{2}$ miles from Cape Sirakami, the N.W. point of entrance to the strait of Tsugar. It has a round peak, 974 feet high, and there are two remarkable sugar-loaf islets or rocks lying off its West end. It is an excellent mark for Tsugar Strait.

U SIMA, or *Ohosima*, 2,800 feet high, bears N.W. by W. $\frac{1}{2}$ W. 18 miles from Ko sima.

OKOSIRI ISLAND lies off the S.W. coast of Yezo. The South extreme is low, and detached rocks lie about 2 miles S. of it. Some of these rocks are 10 to 15 feet above water, and apparently a reef connects them with the island. The eastern side of the island is steep-to. The N.E. point of the island appeared from a distance to have a rocky ledge running out a short distance from it. On the Yezo side of the channel the land is high, and the coast apparently bold-to.

DIRECTIONS.—Sailing vessels approaching Tsugar Strait from the westward during foggy weather should guard against being carried by the current to the northward past the entrance. Should the weather be clear when nearing Cape Gamaley, it may be as well to sight it; but if doubtful, shape a course (allowing for the probable current) direct for Cape Greig. Should a fog come on suddenly when nearing this cape, recollect that the coast is clear and sandy, and the soundings are regular to the southward, but rocky with irregular soundings to the northward of it. The cape is steep-to, and, standing out prominently from the coast-line, forms a good land-mark.

No particular directions are required in passing through this strait to the eastward, as there are no hidden dangers, and the north-easterly current will always be found strongest in the middle of the stream.

Approaching the strait from the eastward, steer for Cape Nambu, and endeavour to make it on a N.W. bearing. Pass the cape at about a mile distant, then haul in to avoid the current and to anchor, should it fall calm. In this case, by keeping this shore close aboard, the vessel may probably be drifted up to Low Islet, off Toriwi saki, by the western stream, when the N.E. current is running like a mill-stream in mid-channel.

At the anchorage off Low Islet the vessel must wait a favourable opportunity for crossing the strait. Pass about half a mile from Low Islet, and in crossing the current, take care not to be set to leeward of Hakodate.

Proceeding from Hakodate to the westward against S.W. winds, keep well inside Cape Tsiuka, and if unable to round it, anchor with the stream or kedge about 2 miles to the N.E., weighing again when the next western tide makes. Should the wind be very light, a vessel may not clear the strait in one tide; in this case it will be better to wait a tide to the eastward of Cape Sirakami, and take the whole of the following tide to clear the strait, than run any risk of being swept into the strait again by the current.

Vessels passing through the strait, particularly to the westward, should have a good kedje and 150 fathoms of hawser ready for immediate use, and must keep the land close aboard.

ISLAND OF YESO.

This island, in its time, has been the object of much geographical discussion and criticism. The Dutch commander De Vries, was the first to give a distinct notion of its existence and general character to the world. Subsequently the detailed researches made in the years 1787 and 1797, by La Pérouse and Captain Broughton, and then the voyage of the *Nadijeda*, by Captain Krusenstern, in 1805, cleared up all doubts on the subject, so that, with the exception of the North coast, its geography is known.

At the time of the first Japanese establishment in the island, the inhabitants, according to Golownin, called themselves *Einsu*, from which word the names *Yeso*, *Jesso*, *Aino*, and *Insu*, are derived.

The name of *Yeso*, or *Jesso*, has been adopted by most recent authors, because it is that by which it is most generally known by Europeans, although the name *Aino* is, beyond doubt, that given to the original inhabitants of the island.

Our present knowledge of the island is chiefly drawn from the notices of its original discovery in the Dutch ships *Castricum* and *Breskes*, under Capt. De Vries, in 1643, from that of Laxman in 1792, from Captain Broughton in 1796, and from Captain Rikord, of the Russian navy, in the corvette *Diana*. The northern coast has not been visited, but is copied from the Japanese representations. All the western coast, with the gulfs, bays, and islands in its neighbourhood, are exhibited from the observations of Capt. Krusenstern in 1805. The Strait of Tsugar and Hakodate, the port thrown open to the commercial ports by the American treaty of 1854, have been surveyed by British and American officers, and have just been described.

The Island of *Yeso* is of a triangular form, the sides of which are 100, 85, and 73 leagues in length. The three extremities of this triangle are Cape Soya, the North point of the island, in lat. $45^{\circ} 31' 15''$ N., long. $141^{\circ} 51' 1''$ E.; Cape Serakami or *Nadijeda*, the South point, in lat. $41^{\circ} 25' 10''$ N., long. $140^{\circ} 9' 30''$ E.; and Cape Nossyam or Broughton, its eastern extreme, in lat. $43^{\circ} 38' 30''$ N., long. $146^{\circ} 7' 30''$ E.

Yeso is separated from the Kurile Islands on the S.E. by a strait, named by Krusenstern the *Strait of Yeso*, which is about 8 miles broad in the narrowest part, that is, opposite the S.W. point of the island of *Kunasiri*. This part of the coast has not been yet surveyed. All that is known of it is that it forms a deep bay, and that the extremity of *Kunasiri* advances very far into this bay, so that the eastern cape of *Yeso* entirely hides the strait which separates the two islands, from which cause those navigators

who have sailed along here have taken Kunasiri and Yeso to be but one island, an error which had been followed by nearly all geographers.

CAPE BROUGHTON,* or *Nossyam*, the eastern cape of Yeso, according to the observations of the commander whose name it now bears, lies S. 65° W., 10 leagues distant from the Island of Chikotan; lat. $43^{\circ} 38\frac{1}{2}'$ N., long. $146^{\circ} 7\frac{1}{2}'$ E. It forms the extremity of a tongue of land of 10 miles in length surrounded by rocks and islets.

Port Nemoro is on the inner side of the tongue of land, at 6 miles to the W.S.W. from its extreme. Laxman anchored here in the *Elizabeth*, and found a Japanese establishment.

The strait separating Yeso from Chikotan is 10 leagues in length, but it is much contracted by rocks and breakers, which occupy an extent of 20 miles, so that, to pass through this strait, the only safe channel is between Walvis and Tchikotan Islands.

Cape Siretoko or *Spanberg*, a name also applied by Admiral Krusenstern in honour of the first Russian navigator who visited these parts, lies in lat. $44^{\circ} 35'$, long. $145^{\circ} 0'$.

Cape Broughton, and another cape lying 13 miles N. 60° W. from it, form the two extremities of a bay which Krusenstern has named *Laxman Bay*, in which is found *Port Fureck*, 7 miles to the S.W. of Nemoro. Near the N.W. point of this bay there is another port, named *Notsky*, the position of which is somewhere about lat. $43^{\circ} 45'$ N., long. $145^{\circ} 52'$ E. *Port Atkis* lies S.W. $\frac{1}{4}$ W. 38 miles from Cape Broughton, in about lat. $43^{\circ} 20'$ N., lon. $145^{\circ} 30'$.

Between Atkis and Cape Broughton, Laxman places several islands near the land, one of which is before the entrance to Port Atkis, and others joined by a reef called *Rikimushiri* and *Chigab*, at 7 miles N.E. of this entrance. The two *Erero Islands* are 12 miles farther in the same direction. At 4 miles S.W. from Cape Broughton are two others, named *Imoshiri* and *Somoshiri*.

The Bay of Good Hope, according to Jansen's chart, lies to the S.W. of Atkis. It is deep, but its mouth is narrowed by breakers, extending off both points of the entrance. The soundings throughout vary from 5 to 16 and 17 fathoms. A projecting point, called *Cape Swars*, is on the right side of the bay, and forms the entrance of the inner bay. The eastern point of the bay is called *Cape Matsuyker*, in lat. $43^{\circ} 0'$ N.

Cape Eroen or *Evoen*, the S.E. extremity of Yeso, is very imperfectly known and placed on the charts. It may be in lat. $41^{\circ} 59'$ N., long. $142^{\circ} 55'$ E.

* Admiral Krusenstern says:—"In honour of the English navigator who has, with a slight exception, made the circuit of the Coasts of Yeso, and first determined the geographical position of its eastern extremity, I have named it Cape Broughton."

VOLCANO BAY is to the northward of Hakodate, on the eastern side of the peninsula. It was visited and named by Broughton in Sept., 1796, and it was surveyed by the U.S.S. *Southampton*, one of the American expedition, in May, 1854.—(See Narrative, pp. 535—540.) They generally confirmed the description by Broughton, who thus speaks of it:—"I have seen few lands that bear a finer aspect than the northern side of Volcano Bay. The entrance into this extensive bay is formed by the land making the harbour, which the natives call Endermo, and the South point, which they call *Esaymi*. They bear from each other N. 17° W. and S. 17° E. 11 leagues. There are no less than three volcanoes in the bay, which induced me to call it by that name.* There are 50 fathoms of water in the centre, and the soundings decrease on the approach to either shore. During our stay at the period of the equinoxes, we experienced generally very fine weather, with gentle land and sea winds from the N.E. and S.E., and no swell to prevent a ship riding in safety, even in the bay, and the harbour of Endermo is perfectly sheltered from all bad weather.

Endermo Harbour, on the western side of the North point, affords good shelter from all winds, bringing the bluff on the extreme part of the isthmus, which forms the starboard point in coming in to bear N.W. In this situation we found 4 or 5 fathoms; and the port entry point on the North shore was on with the bluff. In running for the harbour, the island must be kept open with the starboard entry point till within half a mile of a small islet (which is only so at half tide), and then you must steer in to the S.W., when the water will be shoaled, and any berth taken you may prefer. The soundings gradually decrease from 10 to 2 fathoms, soft bottom. A few houses were scattered on the South side of the harbour: and towards the head the shores are low and flat, so much so as to prevent boats landing within 100 yards. In all other parts wood and water are procured with the utmost convenience. The small island was named *Hans Olason Island*, from one of Broughton's seamen who was buried there. The harbour is formed by the apparent island, which is an extensive peninsula, of a circular figure. Lat. of Cape Yetomo at the entrance, 42° 21' N., long. 140° 56' 30" E. High water, full and change, 5^h 30^m; rise and fall, 6 feet."

The U.S. expedition found a Japanese settlement in the harbour; the officials here received them in a friendly manner, and had carefully preserved the grave of Broughton's seaman.

The **STRAIT of TSUGAR** and the treaty port of Hakodate, have been before described.

Cape Sirakami or **Nadiejda**, the S.W. point of Yeso, which has been before mentioned, was observed with great precision by Capt. Krusenstern

* These volcanoes, one especially, was in action in May, 1854.

to be in lat. $41^{\circ} 25' 10''$ N., long. $140^{\circ} 9' 30''$ E. It therefore forms the N.W. point of the entrance to the Strait of Tsugar; the opposite point, on Nipon, being Cape Tsugar, which is in lat. $41^{\circ} 16' 30''$, long. $140^{\circ} 14'$ E., so that the strait is here 9 miles broad.

The two islands, *O-sima* and *Ko-sima*, are only black, rocky mountains, of volcanic origin. In coming from the North, there would not be a better guide for entering the strait than by bringing *Ko-sima* exactly before its entrance. *O-sima* is of a round form, in lat. $41^{\circ} 31' 30''$, long. $139^{\circ} 19' 15''$, 6 miles in circumference. The other is long, and 10 miles in circuit, lying in lat. $41^{\circ} 21' 30''$, long. $139^{\circ} 46'$. A high rock lies some distance to the North of the latter.

MATSUMAE, or *Matsmai*, the capital of the Island of Yezo, lies in a bay of the same name to the N.W. of Cape Nadiejeda. The two capes forming this bay lie N. 70° W. and S. 70° E. from each other 4 leagues apart. The northernmost, *Cape Matsumae*, in lat. $41^{\circ} 25'$, long. $140^{\circ} 7' 20''$. The city of Matsumae is directly to the East of this cape, 7 miles distant, that is, in lat. $41^{\circ} 30'$, long. $140^{\circ} 14'$. According to Broughton, a small island, apparently joined to the land by reefs, lies near its N.W. point. On it he perceived a small building, perhaps a guardhouse.

Cape Sineko is to the N.W. of Cape Matsumae, in lat. $41^{\circ} 39' 30''$, long. $140^{\circ} 4' 15''$, according to Captain Krusenstern's observations. At 40 miles N. 8° W. from it is *Cape Oote Nizavou* of the Japanese charts; this also was determined by Captain Krusenstern; lat. $42^{\circ} 18' 10''$, long. $139^{\circ} 56'$. To the S.E. of it is the *Island of Okosiri*, mentioned on page 652, distant 12 miles from the coast. It is 11 miles long, in a N.N.E. $\frac{3}{4}$ E. and S.S.W. $\frac{3}{4}$ W. direction.

Cape Kutusoff is in lat. $42^{\circ} 38'$, long. $139^{\circ} 56'$. It lies to the northward of Cape Oote Nizavou, and is remarkable for a high mountain, the position of which is lat. $42^{\circ} 38'$ N. and $140^{\circ} 1'$ E. Between these two capes is *Kutusoff Bay*.

Sukhtelen Bay is formed to the South by Cape Kutusoff, and to the North by *Cape Novosilzov*, in lat. $43^{\circ} 14' 30''$, long. $140^{\circ} 25' 30''$. It projects into the sea more than 20 miles in a North and South direction. The bay is only separated from Volcano Bay on the South side by an isthmus 20 miles in breadth.

Strogonoff Bay lies to the northward of Cape Novosilzov. It was thus named by Capt. Krusenstern in 1805, and is 12 leagues in depth from N.W. to S.E., by 14 leagues from Cape Novosilzov to *Cape Malaspina*, in lat. $43^{\circ} 42' 51''$, long. $141^{\circ} 28' 30''$.

To the N.E. of this latter cape is *Peak* or *Mount Pallas*, in lat. $44^{\circ} 0'$ N., long. $142^{\circ} 4'$ E. This will point out the position of a bay with low shores, which lies between Capes Malaspina and *Schischkoff*. This is lat. $44^{\circ} 20'$, long. $141^{\circ} 47'$.

Off this latter cape are two small islets, *Teurire* and *Yanikessery*, lying 12 miles N.W. of the cape.

CAPE NOSYAB or Romanzoff is the N.W. extremity of Yeso; it was thus named by Krusenstern, and is placed by him in lat. $45^{\circ} 25' 5''$, long. $141^{\circ} 44' 20''$. A narrow and low tongue of land extends nearly a mile to the N.W. from this point. There is a large bay between Cape Romanzoff and another lying N. 62° E. 14 miles distant, called *Soya* by the inhabitants. The *Nadijeda*, Capt. Krusenstern's ship, anchored in this bay, which also received the name of Romanzoff, at the entrance of a small bay in the southern part of the greater bay, at 2 miles from the nearest shore, in 9 fathoms, an excellent bottom of fine sand and mud.

Near to Cape Romanzoff are two islands, mentioned on page 578, *Refunsiri* and *Risiri*. The first is the Cape Guibert, and the second the Pic de Langle, of La Pérouse, who thought that both formed part of Yeso. The Pic de Langle, according to Captain Krusenstern's observations, is in lat. $45^{\circ} 11' N.$, long. $141^{\circ} 12' 15'' E.$, and is probably the mountain which the Dutch called Blyde Berg.

Cape Guibert, that is, the N.E. point of Refunsiri, is in lat. $45^{\circ} 27' 45'' N.$, long. $141^{\circ} 0' E.$ It is high in the centre, and extends 12 miles in a N. by E. and S. by W. direction. A dangerous rock, with only 8 feet water over it, lies about 9 or 10 miles northward of Refunsiri.

The *Barriek Rock* is reported to lie 12 miles West of Refunsiri, lat. $45^{\circ} 42'$, long. $140^{\circ} 42' E.$

Cape Soya is the northern point of Yeso, and forms the narrowest part of La Pérouse Strait. A reef, awash, lies 7 or 8 miles E.S.E. of it.

The Strait of La Pérouse, which separates Yeso from Saghalin, has been before noticed.

THE WEST COAST OF NIPON.

The West coast of Nipon is but little known, and should therefore be navigated with necessary prudence and caution. The only parts at present surveyed are the islands Sado, Awa sima, and Tabu sima, and the strait between Sado and Niigata, by H.M. ships *Actæon* and *Dove*, in 1859. The coast from Tsugar Strait (page 645) to Cape Noto has been partially explored by the *Bittern* and other of H.M. ships, the Russian gun vessel *Djigit*, and H.M. surveying vessel *Saracen*. The latter vessel has also explored the coast between Cape Louisa (lat. $34^{\circ} 40' N.$) and the western entrance of the Inland Sea.

The coast between Sado and Cape Louisa does not appear ever to have been sighted by European ships; its coast line has been taken from the Japanese manuscript, and may, with the exception of possible dangers off it, be regarded as accurately delineated.

North Pacific.

BITTERN ROCKS.—This group of three small rocks, two above water and one awash, was discovered by H.M.S. *Bittern*, 8th July, 1855. They lie close together, within the space of two cables, steep-to on their western side, having 15 and 17 fathoms at the distance of 2 cables, and no bottom with 140 fathoms at $1\frac{1}{2}$ miles. The face of the rocks was covered with seals, which were with difficulty dislodged.

The south-western or largest rock, in lat. $40^{\circ} 31' N.$, long. $139^{\circ} 31' E.$, and lying W. by S. about 15 or 17 miles from Cape Gamaley, is about 18 feet high, and in size and appearance resembles the hull of a vessel of about 200 tons.

Tabu Sima (Observatory Rock off the East extreme of which is in lat. $39^{\circ} 11' 53'' N.$, long. $139^{\circ} 34' 17'' E.$), is in shape somewhat of a horseshoe, with a club at its N.E. end. It is on top nearly a flat, varying from 120 to 150 feet in height. Its greatest length is $1\frac{1}{4}$ mile N.E. and S.W., and its widest part, the N.E. end, is not quite a mile across. No supplies could be obtained, except a few fish. Springs of excellent water abound.

The *Acteon* anchored in 25 fathoms off the bay on the S.E. side, with the South extreme of the island bearing S.W. by W. $\frac{1}{2}$ W., and Observatory Rock N.N.E. The Russian gun-vessel *Djigit* anchored in the same bay in 9 fathoms over a coral bottom. It affords shelter from all winds prevalent in the Japan Sea.

Awa Sima, the N.E. extreme of which is in lat. $38^{\circ} 29' 36'' N.$, long. $139^{\circ} 16' 7'' E.$, is a narrow strip of land running N.N.E. and S.S.W., and reaching at its southern extreme an elevation of 680 feet. It is $3\frac{1}{2}$ mile in length, and nearly a mile in breadth, the widest part being in the centre, where, on the East shore, is a fishing village, while another stands at the South end of the other shore, in a small bay protected by a natural break-water. The inhabitants were, as well as at Tabu sima, very civil. Nothing but fish could be obtained.

SADO ISLAND, lying 25 miles westward of the important trading port of Niigata, is $33\frac{1}{2}$ miles long, N.N.E. and S.S.W., nearly 17 at its widest part, and is composed of two parallel mountain ranges lying N.W. and S.E. of each other, the neck of land joining them being a plain, on the N.E. and S.W. sides of which are formed two extensive open bays. A remarkable sharp conical hill, 700 feet high, stands on a flat off the North extreme of the island, and from a distance looks like an isolated rock. To the northward of this are a few detached rocks close to the shore, and one off *Ya saki* or *Wa saki*, the north-eastern point of the island, which is in lat. $38^{\circ} 19' 55'' N.$, long. $138^{\circ} 27' 9'' E.$

This latter point rises somewhat abruptly, and gains an elevation of 3,800 feet, from which the land, descending slightly, runs in rocky ridges to the S.S.W. for 10 miles, and terminates in a sharp nipple of 4,500 feet elevation, whence it descends in a gentle uniform slope to the southward. The

West point of the island has a bold, clean shore, whence the coast recedes round Sawa-umi Bay to the S.E., and is low. There are numerous fishing villages along the western shores, and a few boat harbours were seen.

Anchorage.—If Niigata should be opened to European trade, no vessel except a powerful steamer could, during the autumn or winter months, remain at anchor off that port, as gales of wind commencing at S.W., and veering to N.W. rapidly succeed each other, and send in such a heavy sea that no ground tackle could be depended upon, and the holding ground is very indifferent. Under these circumstances, the most prudent course to adopt would be to anchor under shelter of Sado, and have the cargo transported from Niigata in junks or light draught steamers.

The bend in the coast line on the N.E. side of the island forms an extensive bay called *Minato-mats*, which affords anchorage in 12 to 16 fathoms, sheltered from E. by S. (round South and West) to North. A continuous rock, 60 feet high, called *Siza*, marks Okawa Point, the South extreme of this bay, in which no known dangers exist. At the head of the bay is the town of *Ibessa* or *Yebisu*.

Another eligible anchorage will be found off Oda village, a quarter of a mile S.S.W. of Matsu saki, a low projecting tongue of shingle, bearing S.S.W. $\frac{1}{2}$ W. distant $10\frac{1}{2}$ miles from Okawa Point.

A few fowls, some fish, and vegetables were obtained by the *Acteon* during her stay at Sado. Firewood may be obtained, but it is supposed not in sufficient quantities for steaming purposes. Nearly every little valley has its stream of excellent water flowing down to the beach. Coal is not known.

NIEGATA.—This was one of the treaty ports to be opened on January 1, 1861, but this has not been hitherto carried out. The city of Niigata stands on the left bank of, for Japan, a rather large river, with 4 fathoms water within the entrance; but a bar off the entrance seals it to vessels of greater draught than 7 or 8 feet. In fresh breezes from seaward the sea breaks across the entrance, and at that time not even a boat could cross the bar without risk. The roadstead off the river's mouth is quite exposed, and the holding ground bad.

Niigata is the most opulent city on the West coast of Nipon. It contains about 35,000 inhabitants, and appears to absorb nearly the whole junk trade of that side of the island, but it is not adapted for foreign vessels.

The city is situated on an extensive alluvial plain, intersected by many rivers, which fall near the coast into the main stream, the Sinano gawa, which takes its rise about 120 miles to the southward. This low coast extends for 42 miles, and presents an even appearance, dotted with trees and houses. When bearing South or S.S.W., it is seen clearly intersected by the river entrance, filled with junks; from other directions their masts are visible over the land, one fleet of them lying just within the entrance, and another more to the southward, off the city. Farther to

the East, on a small elevation, is seen the town of Aosima yama and high mountains rise in the interior.

Soundings reach to a considerable distance off the mainland in the vicinity of Niëgata; vessels, therefore, running between Sado and Nipon at night, or in a fog, should keep the lead quickly hove. Should soundings be obtained and decrease gradually, the mainland is being approached. A run of very deep water will be found on the Sado side of the channel.

The U.S.S. *Shenandoah*, Commodore J. R. Gouldsborough, anchored off the city in 1867, in 10 fathoms water; mud and fine black sandy bottom. Twelve feet of water was found upon the bar, high water; rise and fall, 4 feet.

The bar has two boat channels; the one to the East is deepest. There is a sand-bank about half a mile from the land, and about one mile wide; inside the bar there are 4 fathoms. The coast is low for some distance, and presents an even appearance, dotted with trees and houses.

The left bank of the river from its mouth is sandy, and first turns S.S.W. and then S.W. up to the city. The right bank is sandy at the entrance, then marshy, but steep; it trends S.E. by S., and then runs parallel to the left bank. The broadest part of the river is 6 cables, opposite the second bend.

The city, which is of great extent, is intersected by canals crossed by bridges, their banks shaded by weeping willows. It is surrounded by gardens of the pear tree, peach, and vine; between the trees are planted turnips, onions, and mustard. The position of the governor's house is lat. $37^{\circ} 58' 51''$ N., long. $139^{\circ} 9' 45''$ E.

The town of *Aosima yama* stands near the embouchure of a river, which also has a bar carrying only 7 feet. It is said to be 6 miles N.E. of Niëgata, but is but half that distance according to the Japanese manuscript.

For the distance of 4 miles a strong indraught, on the flood tide, is experienced off the entrance of Niëgata, greatly to the inconvenience of sailing vessels seeking an offing. The ebb would, of course, assist them off the land.

At 15 miles S.W. $\frac{1}{2}$ W. from Niëgata the low shore terminates at *Kadota-yama Head*, $4\frac{1}{2}$ miles North of a spur of the fine peaks of *Yafiko yama*, which has the appearance of a blunt cone sloping on the West. A mile to the South the peak of *Kauriko yama* rises to a higher elevation.

TOYAMA BAY.—The coast to the S.W. of *Yafiko yama* is very high, especially near this bay, where the three snowy peaks of the *Sa-yama* mountains appear above the clouds. *Cape Roiven* or *Noto*, is the western point of entrance to this extensive bay, which is broadly open to the North and N.E. The *Djigit* passed along its eastern and southern shores, both of which are very populous, as was evident in the number and extent of the villages seen. Some rivers flow into the bay, but having bars like that of Niëgata they

are not accessible to ships. All the anchorages off the villages are more or less exposed to winds from the northward. The *River Gensiu gawa*, on which the town of *Toyama* stands, has a bar of 7 feet water completely across it.

This bay is in every respect inferior to the roadstead off *Niigata*, and with strong northerly winds more difficult to quit. The harbour of *Unoura*, on its western side, was not examined, but according to the Japanese manuscript it is spacious.

Yutsi sima, in lat. $37^{\circ} 50\frac{1}{2}'$ N., $136^{\circ} 55'$ E., is 40 feet high, about two-thirds of a mile in diameter, level, and cultivated; there are a few stunted trees on it, and a small village on its southern side. With the island bearing N.N.W. 5 miles, the depth was 46 fathoms, fine sand.

The **Astrolabe Rock**, in lat. $37^{\circ} 35'$ N., $136^{\circ} 54'$ E., 200 feet high, and about a quarter or a third of a mile in diameter, is the largest and highest of a group of five rocks, which extend nearly $1\frac{1}{2}$ mile in a N.E. and S.W. direction, and vary from 200 to 70 feet in height.

CAPE NOTO or Roiven, in lat. $37^{\circ} 28'$ N., $137^{\circ} 22'$ E., is elevated about 700 or 800 feet, the land rising 1,200 to 2,000 feet to the westward of it. At 12 miles W. by S. from the cape is a remarkable white cliff that shows well to the westward; from this cliff the coast bends in to the southward and forms *Waisima Bay*. The opposite point of the bay is about 8 miles distant, and immediately above it is the sharp peak of *Wasisu yama*, elevated 2,000 feet, which is the highest point in the neighbourhood, the land being generally level and of an uniform height of about 800 or 1,000 feet. At 10 miles W. by S. from *Waisima*, or 30 miles W. by S. from *Cape Noto*, the coast at *Isonosu*, a prominent projecting hill, 800 feet high, trends away sharply to the southward, 12 miles to the entrance of *Nanao*.

Nanao, or Nanow, is in lat. $37^{\circ} 2'$ N., long. $136^{\circ} 58'$ E. The entrance to this harbour is about half a mile wide; but after passing the projecting point which forms the narrow entrance, a wide and capacious bay opens.

The city of *Nanao* is situated in the extreme western angle of the bay, and soundings gradually decrease from 14 fathoms at the entrance until you reach the anchorage off the town.

Two small islands, 10 feet above water, lay about $2\frac{1}{2}$ miles off from the town; good water all round these islands, except about 800 feet W.N.W. off the western one, where there is a patch of 16 feet. By keeping the starboard hand aboard, on entering and passing about a quarter of a mile from the only bluff point on the western side as you enter the harbour, you will carry 7, 6, 5, and 4 fathoms water, muddy bottom.

The population of *Nanao* is about 15,000, and its exports very little, if anything—a few dried fish and mats only. A ship-yard is being built to the eastward of the town.

Nanao has two entrances, caused by an inlet about 3 miles long, parallel with the coast and between the northern and southern extreme point of land which forms the entrance to this spacious bay. There are no peculiar features of the coast, or landmarks, to denote their entrances as you approach them from the sea. A sunken rock exists about 5 miles from the southern point, and a reef is said to exist off the northern point of the South entrance. The northern entrance is said to be more free from obstructions than the southern.

Bring the middle of the southern entrance to bear W. by S. $\frac{3}{4}$ S., and then run for it. After entering the channel, keep close over to the North shore, running parallel to a line passing through North Channel bluff and Matui-Osaki, which will be a course about W. by S. $\frac{3}{4}$ S.; but do not get inside the bight between the two points, for there is a shoal there with only 3 feet of water on it bearing S. by W. from a little village. In passing through the channel South of North Channel Bluff, borrow on the northern side, which may be approached quite closely, and steer in towards the harbour S.W. by W. $\frac{3}{4}$ W.

The southern side of the entrance of Nanao is said to be quite rocky, with dangerous reefs extending from it in an easterly direction to the distance of 5 miles.

From North channel bluff steer S.W. by W. $\frac{1}{4}$ W., by compass, until the North side of square cliff (Ota) is in line with East end of Mejima; then steer S.W. $\frac{3}{4}$ W. until the North end of square cliff is in line with the centre of Ojima, when steer S. $\frac{1}{4}$ E. until the centre of square cliff bears E. $\frac{1}{2}$ N., where a good anchorage will be found in $4\frac{1}{2}$ fathoms water. This is about the centre of the harbour.

The danger to be avoided in entering this harbour is a 16-foot spot, which is 850 yards from Ojima, and in range with that island and the North end of square cliff.

Mikuni Roads.—This place is about 58 miles southward of Nanao, in lat. $36^{\circ} 12' N.$, long. $136^{\circ} 8' E.$ The U.S.S. *Shenandoah* came here in 1867.

The approach to Mikuni roads is bold to within half a mile from the shore, when the soundings vary from 9 to 6 fathoms.

The best anchorage is to bring the West end of *Assinia Island* to bear N.; then steering North or South, as the case may be, until the mouth of Mikuni River (which is easily distinguished) bears E.S.E., when 7 fathoms will be found; bottom sand and hard mud; good holding ground. The course can then be laid E.S.E., steering for the entrance, and, as the soundings are gradual, suitable water may be found for an anchorage. There is bold water off the West side of *Assinia Islands*.

The town of Mikuni is said to contain about 10,000 inhabitants, and their exports silk and dried fish. It is situated on the right bank of the river, about half a mile from its mouth; the bar has only 6 feet at low water.

Rise and fall of tide about 9 feet. The anchorage in the outer roads is exposed from S.W. round West to North, but completely sheltered from all other winds.

WAKASA BAY, an opening 25 miles wide, commences at 18 miles beyond Mikuni. At its S.E. angle is Tsuruga Bay, and in the S.W. angle is Myadsu, both visited by the *Shenandoah* in 1867.

TSURUGA BAY, in lat. $35^{\circ} 39' N.$, long. $136^{\circ} 4' E.$, is a large inlet, which extends to within 10 miles of the Biwa Lake, and from this possesses some importance, as the capital of Japan is near the S.W. end of the lake, and it has been proposed to connect the bay with Oosaka by a *railroad*.

The American directions follow:—Approaching Tsuruga Bay from the northward, steer so as to be distant 6 miles from the North end of Tamagawa when it is brought in line with Ibo Point; then steer S.E. $\frac{1}{2}$ S. until a triangular white cliff, to the left of the town, is opened, when bring it to bear S. $\frac{1}{2}$ E., and then steer for it until the first prominent point on the left of the bay, going in, is brought to bear E. by N. $\frac{1}{2}$ N.; then steer S. $\frac{1}{2}$ W. to the anchorage.

This harbour is very easy of ingress and egress, and, so far as is known, free from rocks. No soundings under 13 fathoms until you get well in the harbour; the western shore should be avoided.

It is said that during autumn and winter a heavy swell sets in when the wind is from the northward and westward. The land around is high. The town of *Tsuruga* is at the head of the bay, and contains about 15,000 inhabitants; exports, dried fish and rice. Good lime is made in the neighbourhood of Tsuruga. Rise and fall of the tide 2 feet.

Myadsu, in lat. $35^{\circ} 32' N.$; long. $135^{\circ} 15' E.$, the southernmost of the Okino Islands, bears N.E. $\frac{1}{2}$ E., distant about 8 miles from the entrance to Myadsu, which is an excellent harbour, completely landlocked, with good holding ground.

With this island on that bearing, steer S.W. $\frac{1}{2}$ W. between Whale Point and Okatashima, then steer S.W. $\frac{1}{2}$ S. until at the mouth of the harbour, when steer direct for the battery. The soundings from the mouth of the harbour will gradually decrease from 11 to 7 and 6 fathoms to abreast of the town, with bottom of sticky mud. The best anchorage is on a North line from the battery in about 8 fathoms, with mud bottom and good holding-ground. At the right of the town, and off a red sand-bank about 150 yards, a sounding of 1 fathom was found.

This is a harbour easy of ingress and egress, free from dangers; the shoalest water is on the western shore; a rock exists on the eastern side of the entrance between the two inner points. Keep mid-channel, and you will carry good water up to the anchorage.

The town contains about 12,000 inhabitants. Silk is manufactured in the neighbourhood, and this is a great mart for dried fish. A four-gun battery

is erected in front of the Damio's residence. The rise and fall of the tide is barely perceptible.

OKI ISLANDS.—The Oki group consist of one large and a group of three smaller islands, and a number of islets and rocks. They lie N.E. and S.W. of each other, and occupy an extent of 23 miles in that direction. There is an open and apparently safe channel between the large islands and the group of smaller ones.

Oki sima, the N.E. or largest island, about 10 miles in diameter, has a number of detached high rocks close to its northern point, which is steep and cliffy. Its S.W. extreme is remarkable from its terminating in a high steep bluff; its S.E. point is comparatively low. The highest part of the island was estimated at 3,000 feet elevation.

The group of three islands is about 9 miles in diameter, and probably good anchorage may be found as there are deeply indented bays. The North point of *Nisi sima*, the western of the three, rises to a sharp peak of 1,700 feet elevation. The other two are about half that height. They appear to be thickly populated, and the hills are cultivated to their summits.

Mino Sima is in lat. $34^{\circ} 47' N.$, long. $131^{\circ} 7' E.$, and 20 miles distant from the northern coast of the province of Nagato, which forms the foot of Nipon. Its highest part, elevated 492 feet, is in the centre of its West side. Its sides appear steep and cliffy, except on the N.E., where there is a sandy bay. A large square rock lies half a cable off its eastern point, and there is an islet on its N.W. side.

NATSUNGU SAKI, or Square Rock Point, is the northern extremity of the western prolongation of the toe of Nipon; it is 20 miles S.S.W. of Mino sima, and 30 miles northward of the western entrance of the Inland Sea. It appeared to be about 700 feet high, with a nipped outline, bordered by high cliffs on the North, and slightly tapering towards the sea, where it was about 500 feet in height. It may be easily known by the remarkable square rock or head springing from its base, and which, being entirely detached from the high land of the point, gives it the appearance of an island. Seen at the distance of 24 miles from the N.E., it assumes the appearance of gently shelving table-land, having three or four large notches, the sharp cone of Aoumi sima and the distant summit of Kabuto yama showing to the eastward. This sharp and remarkable cone, of 700 feet elevation, marks the eastern point of the deep bay of Fukugawa.

CAPE LOUISA, or Takayama, E. by S. $\frac{1}{4}$ S. 24 miles from Mino sima, is a remarkable sharp peak, 1,800 feet in height, on a projecting and very prominent point of the coast, 34 miles E. by N. $\frac{1}{4}$ N. from Square Rock Point. This peak appears quite isolated as seen from the vicinity of Square Rock Point.

Ai Sima, or Richard's Island.—Between Square Rock Point and Cape Louisa there is a large bay, with many islands on it, generally about 200 ft.

high, and flat-topped, with cliffy inaccessible sides. The largest are Ai sima and O sima. *Ai sima*, the outer, is midway between the above capes and just within the chord of the bay; it is elevated 400 ft., having a flat-topped hill in its centre. *O sima*, 5 miles East of Ai sima, is also 400 feet high, but longer and flatter. *Aoumi sima*, $4\frac{1}{2}$ miles in length East and West, is 10 miles East of Square Rock Point, its western point being the sharp cone before alluded to. On the Japanese chart there is represented between this island and the coast, a finely sheltered and capacious harbour called *Misumi*.

Between Ai sima and the East part of Aoumi sima the *Saracen's* track survey represents four doubtful islets, which do not appear on the Japanese manuscript.

Igama Bay is an inlet running in 7 miles in any easterly direction on the South side of Square Rock Point. The north-western corner would appear to afford the best anchorage, but no part of it has been explored.

Kado Sima (*Double Wedge Island of Richards*) is 1 mile off the South point of entrance to Igama Bay. It is $2\frac{1}{2}$ miles long E.N.E. and W.S.W., and of very peculiar formation as seen from the North, being divided nearly equally into two very flat quoins, the points of the wedges being both to the westward, and their steep falls to the East.

Simonoseki Strait.—From this island the coast trends southward to the entrance of Simonoseki Strait (page 603), which is approached by a very even and gradually decreasing depth. The shore should be given a berth, as, where surveyed or seen, it was found to be very rocky.

WEST COAST OF KIUSIU.

KOTSU SIMA, or *Colnett Island*, the name by which it is more usually known, lies in the Korea Strait, nearly midway between the East coast of Tsu sima and the western entrance of the Inland Sea. In clear weather it can be seen from Iki Island, Tsu sima and the coast. It is a mile wide at its broadest part; its sides are steep, with a high cliff at the N.E. point, and rise with slight irregularities to a central peak 300 ft. high. At a great distance the slopes appear even. Four notched rocks or islets, 80 feet high, and visible 12 miles, lie 4 cables S.E. by S. of the South point.

Orono Sima (*Obree Island*), in lat. $33^{\circ} 52' N.$, long. $130^{\circ} 0' E.$, and 37 miles W. by S. of the Siro simas at the entrance of the Inland Sea, is a double-topped island, the South hill of which, and the higher, is elevated about 300 feet. It is about a mile in diameter. There appear to be no dangers between this island, Colnet, Iki, Tsu sima, and the entrance of the Inland Sea.

Kosime no oo sima, or *Wilson Island*, lying about 2 miles off the northern coast of Kiusiu, is remarkable from its prominent position off the entrance of

the Inland Sea. It is somewhat flat, with a hill 854 feet high rising from its centre, surmounted by a large clump of trees, and is visible in clear weather at 30 miles.

A shoal extends to the eastward from the S.E. part of this island, having 3 fathoms on the outer end at a distance of 6 cables.

GENKAR NADA is the sea comprised between Iki Island, Wilson Island, and the mainland. The numerous islands within it are generally safe of approach, and the adjacent waters are singularly free from danger. Not so the eastern part of the Genkar nada, where lie three very dangerous tidal and sunken rocks. The soundings appear very even, except in the vicinity of these rocks; the bottom is sandy or gravelly.

A steamer taking this route only effects a saving of 8 or 10 miles, but a sailing vessel proceeding to the southward would benefit considerably by keeping inshore in the Genkar nada out of the north-easterly current, and taking advantage of the tides, which are pretty regular, by dropping a kedge when unable to make way.

The COAST.—From abreast Wilson Island the hills decrease in elevation from the double peaks over *Kanega saki*, the West point of the North coast of Kiusiu towards the South, but high mountains are seen in the interior. Southward of *Katsura saki* (which has a reef $1\frac{1}{2}$ mile South of it), and off it, is a small conspicuous tree islet, the coast becoming moderately low and wooded. Thence a low strip of sand-hills terminates in the North entrance to Hakosaki Bay.* *Ai sima* is an island of table land, 200 feet high, on which a single tree shows very conspicuously. On the S. shore of Hakosaki Bay is a large city, called *Fukuoka*, the capital and fortress of the Prince of Mino, one of the seven most powerful of the independent Daimios. *Siga sima*, with rocks to the W. of it, off the entrance of the bay, is even and wooded, as is also *Nakosi* or *No-ko-no sima*, a mile to the South. *Genkar sima* or *Reed Island*, round-topped and steep-sided, with a ninepin rock 4 cables N.W. of it, lies off the projection of the main at the South side of the entrance of the bay. The passage South of Reed Island has only 3 fathoms on it. From Reed Island the face of a hilly promontory extends S.W. 9 miles, and on it are two bays, probably affording anchorage. *Kusaya*, the S.W. point of the promontory, is a bluff, $1\frac{1}{2}$ mile W. of which is *Hime sima* or *Hill Island*, about 600 feet in height, with a gravel spit to 6 cables S. of it. South-westward of *Kusaya Point* is another deep bay,† with mountainous shores, which rise to a fine peak upwards of 2,000 feet in height.

Yebosi sima or *Cone Islet*, 128 feet high, 27 miles S.W. by W. $\frac{3}{4}$ W. of

* H.M.S. *Centaur*, J. H. Lawrence, Master, R.N., anchored, in 1861, in this vicinity in a bay called *Ino-sima*, in 12 fathoms, mud bottom and good holding-ground, and protected from all northerly winds; the North point of Reed Island bearing S.W. by W. $\frac{1}{4}$ W.

† The town or fortress of *Karatsu* or *Karano*, belonging to the Prince of Satou, is at the bottom of the southern arm of this bay.

Wilson Island, and 12 miles S. by W. $\frac{1}{2}$ W. of Orono sima, lies in the centre of the southern part of the Genkar nada, and is a most useful guide to avoid its dangers.

Swain Reef, the principal of these dangers, originally placed $3\frac{1}{2}$ miles westward by Mr. Swain, H.M.S. *Roebuck*, 1860, lies in the fairway, 10 miles S.W. by W. of Wilson Island, 16 miles E.N.E. of Cone Islet, and $12\frac{1}{2}$ miles E.S.E. of Orono sima. It is nearly 4 cables in extent, and scarcely covered; some rocks on its eastern part are nearly always seen, being 5 feet above low water. There are 16 fathoms near the edge of the reef, deepening to 10 and 20 fathoms, sand and gravel.

Ellis Reef, lying S.W. 9 miles from Swain Reef, is another danger more out of the fairway of vessels making a direct course through the Genkar nada. It lies E. $\frac{1}{4}$ N. $8\frac{1}{2}$ miles from Cone Island, and W. by N. $3\frac{1}{2}$ miles from the rock off Reed Island. It never quite uncovers, but in bad weather the heads of the rocks are seen. One mile S.S.E. of the reef is rocky ground, with soundings of 4 to 10 fathoms.

Dove Reef, on which some small brown rocks were seen, is 3 miles S.W. $\frac{3}{4}$ S. of the Ellis. It may be passed at a mile on the outside in 19 fathoms, fine sand.

Na sima.—Three clusters of rocks and islets (two in a cluster), 14 to 20 feet above low water, lie eastward of the large island of Iki. Richards places the eastern 4 miles N.W. $\frac{1}{4}$ W. of Cone Islet.

IKI, the largest island off the N.W. coast of Kiusiu, is 10 miles long, North and South, and 9 miles at its widest part. It is of sandstone formation, chiefly table land, the southern part rising to an elevation of 680 feet, and its N.E. hill to 470 feet. There are many islands and reefs off its shores, the deep indentations of which afford anchorage in rather deep water in sheltered harbours, of which Moro yosi on the East coast, Hono ura on the S.W., and Ina minato on the West are the best. Katzmota ura, at the N.W. part of the island, was a wild-looking anchorage, where the swell was seen breaking heavily in fine weather. A vessel may also anchor on the North coast, with the North hill bearing S.E.

A rock, having only 8 feet at low water on it, lies three-quarters of a mile South of the two outermost low flat rocks, Shimo Idzumi and Kami Idzumi, off the East coast of Iki sima; the whole of that East coast is much encumbered by ledges of rocks, extending some distance from the shore.

Kagara (*Christian Island*) is the centre and largest of three islands off the main, $8\frac{1}{2}$ miles S.E. of Iki. *Bunn*, the eastern island of the three, is low, with a clump of trees on its S.E. head, a good object to steer for in passing through the channel East of Bunn. There is a rock 4 cables off the South part of Kagara. *Mat sima*, lying close off the S.W. part of Kagara, has rocks off its extremes.

Passage Reef, a large straggling patch of low flat rugged rocks, lies 1 mile

E.S.E. of Bunn Island. The two highest rocks on it, about 20 feet high, on one of which there is a stone beacon, are the only parts which show at a distance.

Yobuko Harbour is a completely land-locked inlet, $1\frac{1}{2}$ to 2 cables broad, running in $1\frac{1}{2}$ mile southward of the island Kaba sima, which fronts its entrance, and divides its approach into two channels. The junks use the eastern passage.

The western entrance is broad, bold and deep. It can be easily recognized by a remarkable square clump of trees on the low point (*Hato saki*) forming the western boundary of the outer bay. In 1860 H.M.S. *Pioneer* anchored in 11 fathoms of Ibiko village, at the entrance on the western shore.

Hato saki, the West point of entrance to Yobuko, is low and rocky, with a remarkable square clump of fir trees on it, which makes like an islet when first seen from the south-westward. The coast to the southward is much indented, with long rocky points extending from the shore into deep water. The great bay of *Imari* is unexplored.

Madara Sima, or *Covey Island*, lies 7 miles S. by E. of the South point of Iki, and appears bold on all sides. Its West peak, 630 feet high, falls steeply to the sea over a cliff-bound shore. Off the West point is a rock.

Futakami, $9\frac{1}{2}$ miles W. by N. of Madara, is a saddle-shaped island, 320 feet high, with a rock or islet half a mile to the N.W. of it. The outlying *Ko-futakami Rock* is 2 miles further in the same direction.

Atsusi no O Sima, or *Harbour Island*, 13 miles S.W. by S. of Iki, is irregular in shape, and $4\frac{1}{2}$ miles across from East to West. It is rather high, the northern and S.E. hills being the two highest. Its coasts are bold, the only known danger being a small rock 6 cables off the middle part of the N.W. coast, about $1\frac{1}{2}$ mile N.E. by N. of its south-western point.

Port Lindsay, on the South side of the island, is a large bay open to the South, and too deep for convenient anchorage. Although the bay is open and exposed to the South, there is not fetch enough to allow much sea to rise. The western point of entrance is low and flat.

Do sima, a mile South of Atsusi no O sima, has some rounded summits of moderate elevation, showing smooth bare rocky sides. There is anchorage on its South side, West of *Yoka sima*, one of two islets to the S.E.

Ikutski, or *Ykitak Island*, $5\frac{1}{2}$ miles in length North and South, lies close off the N.W. point of Hirado, separated from it by the Obree Channel. Its North point, off which is a rock, has an overhanging cliff of considerable height, facing the West, but which slopes gently to the East.

Obree Channel, about 4 cables wide, has been ascertained to be quite clear, with a depth of 15 fathoms in the middle. The *Saracen* anchored just inside it off the south-east shore of Ikutski, in 7 fathoms, in a snug bay, at about a quarter of a mile off a village. The vessel passed North

and West of an islet and a rock lying in the fairway 2 miles to the north-eastward. A large ship should not keep too close to the south-east point of Ikutski.

HIRADO or FIRANDO ISLAND, 16 miles in length N.E. and S.W., and, owing to its deeply indented coast line, of an irregular breadth of 1 to 5 miles, lies adjacent to the West coast of Kiusiu, from which it is separated by Apex Strait. Hirado is high and hilly, and much wooded, and its coasts, wherever explored, have been found very bold. The *Saracen* passed in deep water through the Obree Channel along its West coast, inside the Aska sima or Sisters, and rounded the islets off its S.W. point at a mile. Over Sisiaki, the South point of Hirado, there rises precipitously a remarkably sharp peak, and $3\frac{1}{2}$ miles in a south-westerly direction from the point is *Sail* (or *White*) *Rock*, the position of which has not been very correctly determined.

The **PORT of FIRANDO**, situate on the West side of the northern point of Hirado, was, previous to 1823, the chief location of British and other foreign trade with Japan, which from that period was restricted to the Dutch at Nagasaki. It was visited by H.M.S. *Roebuck* in 1859, and described as a spacious harbour running East and West, 2 miles deep, and sheltered from all winds. A good guide to recognize its position is a small island lying off the North point of entrance.

There are three islets in the harbour, and good anchorage in 4 fathoms between the southern islet and the shore. The deep arm running to the South just within the entrance was not examined. The large town of Firando stands on the narrow neck between the head of the harbour and Spex Strait.

SPEX STRAIT (also called Hirado Strait), between Hirado and a promontory of Kiusiu, is about 10 miles in length, and navigable without difficulty by steamers, but as the tides at springs are stated to run with great strength through the narrow channel* at its northern part, where for 2 miles the whole breadth of the strait is only 3 cables, and the navigable channel at one part only $1\frac{1}{2}$ cable, a sailing vessel cannot be taken through with safety without a commanding breeze, which, to be relied on, must blow directly through the strait.

Entering by the North, the channel becomes suddenly contracted to $1\frac{1}{2}$ cable West of a rock 10 feet above high water, lying in mid-stream at the entrance, and 2 cables North of the small wooded head of Furato saki on Kiusiu.

* This is the dangerous part of the strait, the great strength of the tides over the uneven bottom, &c., causing small whirlpools to be formed in the middle of the channel. It is indispensable, therefore, especially for a large ship, to have good steering way, which must be kept even with a favouring tide to ensure safety.—Capt. J. Borlase, H.M.S. *Pearl*, and J. S. Compton, Master R.N., H.M.S. *Renard*, 1861. Commander H. A. Reilly, H.M.S. *Pioneer*, 1860, states that the dangers are few, and clearly marked with stone beacons.

Passing within a cable West of this rock, a S. $\frac{1}{4}$ W. course should be steered along the Kiusiu shore, so as to avoid some rocks which break, extending from the Firando shore as far as mid-channel, and also a 2-fathoms patch off the island in front of the town of Firando.

After passing the Daimio's (Prince of Iki) residence, which stands embowered in trees, and can be recognized by the white wall along the shore which surrounds it, the course becomes S.E. by S. and S.W. by S. round the bight opposite the point south-eastward of the residence, off which point, N.N.E. 2 cables distant, is a rock 4 feet above high water. In rounding the bend the Kiusiu shore need not be kept very close aboard.

When proceeding by this route, it will frequently be found necessary to anchor for the night, at which time the strait can seldom be passed. The pilots have usually anchored H.M. ships in *Kawatch* or *Kawatsu*, situated on the East side of Hirado. Another anchorage is eastward of Kuro sima.

Tasko Bay, at the northern part of the strait, is $1\frac{1}{2}$ cable in length and 1 in breadth. There is access to the bay by both channels, but there are only 2 fathoms in that South of the island in the front.

Directions from the *southward* will be given hereafter.

Otate Island and Bonnet Islet, the former a mile N.W. of the latter, and 10 miles S.S.E. of Hirado, lie directly in the fairway between Hirado and Nagasaki. One mile N.W. by W. $\frac{1}{4}$ W. of Otate are two islets, and N. by E. $\frac{1}{2}$ E. half a mile, a rock awash; and again, 3 miles North, a sunken rock has been reported. These are the only known dangers off the group which may be passed on either hand.

Yenoi Sima, 600 feet high, is $4\frac{1}{2}$ miles westward of Otate, and its eastern side, which borders on the channel, is bold, but from South round to N.N.W. of the island are many scattered islets, rocks, and reefs, which render the navigation between it and Hira sima, $2\frac{1}{2}$ miles to the westward, extremely hazardous.

The southern part of these outlying groups is the most dangerous. Two islets, 150 and 50 feet high, West and S.S.W. $1\frac{1}{2}$ and $1\frac{1}{4}$ mile respectively from the South point (a small head) of Yenoi sima, are the most noticeable. The outermost is $5\frac{1}{2}$ W. $3\frac{1}{2}$ miles from the peak of the island.

Hiki Sima is a partially cultivated island, apparently $1\frac{1}{2}$ mile long, about 280 feet high, with a remarkable rounded hummock (cone-shaped) at its S.E. extreme, connected with the main body of the island by a long strip of shore; reefs appeared to extend about three-quarters of a mile off the North side of the island. The easternmost of the Sumo sima group is fully $1\frac{1}{2}$ mile eastward of the other two rocks, with a clear deep-water passage between. The outer rock of the Sumo sima group is a pinnacle rock, with an arch through it.

A dangerous reef runs parallel to and distant about 1 mile from the North

side of the island. A rock, on which the sea breaks, lies 3 cables E. by S. $\frac{1}{2}$ S. from the centre of the island.

The *Brothers*, placed in lat. $32^{\circ} 49' N.$, long. $129^{\circ} 25' E.$, if existing at all, which is somewhat doubtful, must be very small or sunken rocks. They have not been seen of late. They are, however, placed on the latest Dutch survey of 1858.

The GOTO ISLANDS.—This mountainous chain of many islands, lying between the parallels of $32^{\circ} 37'$ and $33^{\circ} 20' N.$, is 50 miles in extent in a N.E. and S.W. direction, and from 5 to 20 miles in breadth. Several important islands and rocks have been discovered on the eastern side by Comm. Brooker, in H.M.S. *Sylvia*, in 1869. The chain may be passed through into the Korea Strait by six channels, all of which, judging from those parts which have been surveyed and from the nature of the coast, probably carry deep water.

Kosaka Channel, the northern of these channels through the group, was entered by H.M. ships *Dove* and *Leven* at dusk, from the eastward, South of the small island *Mutz sima*, 12 fathoms being the least water obtained in the passage, which is about three-quarters of a mile in breadth. *Uku sima* or *Huko* is high, with low land stretching towards its East point. The *Hodge Rock*, the only known danger in this vicinity, is about a mile North of the outermost of several islets which extend 10 miles West of Kosaka.

Kuga Channel.—The *Saracen*, after leaving Nagasaki, stood across to the Goto Islands, and, entering the Naru Channel East of Kaba sima, worked to the westward, and anchored in *Hardy Harbour*, a snug anchorage on the S.W. side of Naru sima, and in the Kagu Channel. This is a small inlet, 6 cables in length North and South, and 3 to 4 in breadth. There is an islet (Observatory) at its entrance, and 1 mile South the larger island Mia sima, of two parts connected by a shingle spit, gives protection from that quarter.

Within Observatory Islet the water is deep, decreasing from 16 to 5 fathoms close up to the head of the harbour, but the more convenient depth of 6 to 7 fathoms may be obtained by anchoring W.N.W. of the islet and rather nearer to the opposite shore. The Kuga Channel was then examined and found to carry deep water, 26 to 32 fathoms, with exceedingly bold shores, and not the least indication of unseen dangers.

FUKUYE, or *Fukai*, the chief town of the Goto Islands, and the fortress of the Daimio, Gotjima Saijemma no Djo, is situate on the shore of an open roadstead on the north-eastern side of Fukuye sima, the southern and largest island of the chain, and southward of the Fukuye Channel, which separates it from Kuga sima.

CAPE GOTO or **Ose Saki**, is the S.W. point of Fukuye sima. Not of great elevation (about 500 feet), it is exceedingly bold, having 45 fathoms water at 2 cables distance, its steep rocky shores receding from the cape at a right angle. Behind, or north-eastward of the cape, rise three fine mountains (about N.N.W. of each other), separated by valleys, of which the northern and highest is 1,387 feet above the sea. At the extremity of the coast, which extends E.S.E. 3 miles from the cape, is Otakara Point, the highest of the two small hills on which is 330 feet. A quarter of a mile S.E. is the islet *Biro sima*, 150 feet in height, with a rock $1\frac{1}{2}$ cable off it to the South.

E. by S. 3 miles from Otakara is Tautara sima, the eastern of the two hills of which is 320 feet high. Reefs stretch off its East and West points. To the North of this island and on the South side of Fukuye, is a large rectangular bay, $4\frac{1}{2}$ miles in length and a mile deep. Situated centrally in the large bay, at 7 cables N.N.W. of Tautara, are the two islets Hitango sima, with deep water midway between.

One mile West of these islets is a rock 15 feet high near the extremity of a large reef, extending south-westward from the shore nearly a mile, and the greater part of which is awash.

Tama no Ura, the name of a large inlet or arm of the sea on the western side of Fukuye sima, is finely situated as a port of refuge, and, but for its great depth of water, would be a magnificent harbour. Its only entrance is $4\frac{1}{2}$ miles N.N.E. of Cape Goto, and $2\frac{1}{2}$ miles S.E. of the island Saga sima, which is $1\frac{1}{2}$ mile in length. In the bay, on the East side of Saga, there is good anchorage in 7 to 8 fathoms, quite sheltered from all westerly winds.

The entrance to Tama no ura is a mile wide, and must not be mistaken for a blind opening 2 cables wide, only 2 miles North of Cape Goto, and which has a reef of rocks extending across its entrance.

The main inlet of the harbour, which has a varying breadth of 3 to 7 cables, follows the contour of the coast-line for 6 miles, separated from the sea by a belt of land, a mile in average breadth. It first runs S. by W. $3\frac{1}{2}$ miles, then curves to the S.E. for $1\frac{1}{2}$ mile to its head. The depth within the entrance is 32 to 38 fathoms, decreasing gradually to 16 at its head, rendering anchorage inconvenient, except at the following position.

Directly south-east of the entrance, and on its eastern shore, the harbour branches into three narrow arms about a mile in length. East, 3 cables from the North of Hallows Island in the centre of this part of the harbour, there are soundings of 10 and 11 fathoms, which offer anchorage, open only between N.W. and N.N.W. Off the inner part of the blind entrance there is fair anchorage in 10 to 13 fathoms, within 2 cables of the South shore of Sima.

The best anchorage for large ships will be found at the S.E. part of the harbour, in 16 fathoms, mid-channel, with the peak of Boshi yama, which

is seen ahead when standing up the harbour, bearing from S.W. by W. to W.S.W.—(Mr. W. Blackney, R.N., H.M.S. *Algerine*, 1861.)

From Tama no ura the coast runs North about 5 miles from Algerine Bluff, falling to a low point, the north-western promontory of Fukuye, which is fronted by shelving rocks. *Hime sima* is separated from this point by a channel a mile wide, in which was seen a rock awash.

The **BAY of NAGASAKI** is formed to the northward of a peninsula of the same name,* between the headlands Nomo saki and Oho saki, which lie North and South of each other, distant 15 miles apart. The bay is fronted by a chain of islands and reefs which quite shelter the harbour, which is an arm or inlet at its head.

Directly East of Oho saki, the northern point of the bay, is a large and unexplored anchorage named *Mikasa*, open only to the S.W. At half a mile S.W. of Tan saki, the eastern point of this bay, is *Kotako sima*, and S.W. half a mile from Kotako sima is a high sugar-loaf islet, inside which reefs have been observed breaking.

NAGASAKI LIGHTHOUSE.—A lighthouse has been erected on the end of a narrow ridge 189 feet above the sea, distant $1\frac{1}{2}$ cable from the extreme North point of *Iwo sima*. The light will be shown from an iron tower about 34 feet high, hexagonal in shape, painted white, with a gilt ball on the top. It is not known when the light will be exhibited.

Iwo sima and *Oki sima* appear as one long island, although separated by a narrow boat-passage. They lie in a N.W. and S.E. direction, and are of undulating outline, the eastern summit of *Iwo*, the outer of the two, being 400 feet in height. Signal Head, the north-western point of this island, is a good guide for entering the bay. It is bold, and may be rounded at 3 cables distance in 25 fathoms. On its summit, which is cleared of trees, there is a signal-staff and look-out house, from which the arrival of vessels is telegraphed to Nagasaki.

Oki, of much the same height as *Iwo*, is more wooded, especially its southern summit. There is access to the harbour by the channel East of *Oki*, between it and *Koyaki*.

Hirase Rock, which covers at high water only, lies 4 cables from the eastern shore of *Iwo*, and E. by S. $\frac{1}{4}$ S., 11 cables from Signal Head, and although not directly in the fairway, is in the route of vessels beating in and out. There do not appear to be any other dangers near it. If covered, the bluff of Papenburg Island, bearing E. $\frac{1}{4}$ S., leads 3 cables North of it.

Sotonohirase Rock, also covering at high water, is 9 cables off the S.W. shore of *Iwo*, and S. by W. $\frac{1}{4}$ W. $1\frac{1}{2}$ mile from Signal Head. It is steep-

* Nagasaki means Long Cape.

to in 17 fathoms on the outside, but this depth is continued on a spit running one mile N.W. by W. from the rock, its outer part in 18 fathoms being W.S.W. $1\frac{1}{2}$ mile from Signal Head, with 37 to 38 fathoms on all sides.

Kutsnose and Kurose Rocks.—The Kutsnose, 10 feet above high water, lies inshore of the Sotonohirase, at $1\frac{1}{2}$ cable from Iwo.

The Kurose is a large straggling reef, of which the southern and highest part is 6 feet above high water. North and N.W. of it several reefs dry in parts on the foul rocky ground between it and the South end of Oki, from which it is distant 4 cables.

Taka Sima, at 3 miles S. by W. of Signal Head, has a precipitous ridge, about 900 feet high on its eastern side, and a smaller ridge over the cliffs on its western or sea-face. Its shores are very rugged, with reefs extending $1\frac{1}{2}$ cables off its North and West points. Three small islands, about 120 feet high, *Tobi sima* to the North, and *Futako sima*, two islands, on the South, lie in line, North and South of its East face. The latter two are connected together, and fringed by reefs. There are coal mines in operation on the East side of Taka sima.

Hi Sima and Nagano Sima, $1\frac{1}{2}$ and 2 miles S. by W. and S.S.W. respectively from the summit of Taka sima, are smooth-topped islands, about 120 feet in height, with rocky shores, and with reefs extending more than a cable off their southern points. Nagano sima is 4 cables S.W. of Hi sima, there being deep water, about 14 or 16 fathoms, in the passage between them.

Mitzuse Rocks, the outermost dangers in the approach to Nagasaki from the South, lie $3\frac{1}{2}$ miles S.W. of Taka sima, and N.W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from the summit of Cape Nomo. They spread irregularly over an extent of half a mile, the interior rocks of the group covering with the tide. On the northernmost rocks are two pointed islets, 60 feet in height, with outlying patches on the East and West; the south-eastern of the group is a bare rock about 6 feet above high water.

CL. 3 NOMO* or **Nomo Saki** is the south-western extremity of the peninsula of Nagasaki. At a distance it has the appearance of an island, and when nearing, it cannot be mistaken for any other land in its vicinity. From the West or S.W. the island Kaba sima will be seen off the low point East of the cape. At 6 cables North of the cape is *Nomoyama Point*, which rises steeply to the wooded summit of a prominent hill, Nomoyama, imme-

* The mistaking of this cape for the South point of Kaba sima led to the wreck of the *Satsuma* steamer. A large ninepin rock lies 2 cables off the extremity of the cape, which is surrounded by small low detached rocks, most of which cover. Off Kaba sima the rocks are compact and shelving, with a single outlying rock awash. There need, therefore, be no difficulty as to its identity in the thickest weather.—1867.

diately beneath which, on a small bare shoulder towards the sea, stands a look-out house. The coast between is broken and rocky, and skirted with dangerous reefs, which dry out in patches to a quarter of a mile. At 2 cables off the cape is an inaccessible islet called Nomo Rock.

Nomo-ura Harbour, the entrance of which is on the western side of the peninsula at 1 mile N.E. of Nomoyama Point, is small and perfectly sheltered, 6 cables in length and from 1 to 2 in breadth. Within, there is a depth of 5 fathoms, but it is only accessible to small vessels, having not more than 9 to 10 feet at high water in the deepest part of its narrow entrance, which is only 100 yards across.

West Coast of Nagasaki Peninsula.—The coast of the peninsula northward from Nomoyama Point is bold, with a few outlying rocks, and may be passed at 2 or 3 cables, in 10 to 13 fathoms. To the N.E. of Nomo-ura the coast is low as far as a hilly point 2 miles distant. Off it are several long reefs, drying out in patches.

The coast for 3 miles N.E. by N. of this hilly point is bold, with soundings of 5 to 9 fathoms near the shore. It lies under a succession of hill ranges, which terminate at a point abreast a group of rocky islets, North of which point the small bay of *Ookomura* affords anchorage in 6 to 8 fathoms. A conspicuous smooth-topped conical islet South of the islet group is very noticeable close off this coast.

Suzume, a bare rock, about 50 ft. high, is the north-western of this group of islets. *No sima*, the southern, and all the other islets, are wooded and low, and surrounded by large reefs.

Koyaki is the largest island off Nagasaki, and is situated directly S.W. of the entrance, which may be gained by the channels both East and West of it. This island is not high, but very hilly, its two chief elevations being 362 and 403 ft. Numerous reefs and islets border its broken outline.

Hadagase is probably united to Joka sima, as the large reef on which that islet stands stretches far towards the rock, as it also does towards Mume-noki. *Hadagase* may be passed at 4 cables on its West side in 26 fathoms. On the eastern side of Koyaki there is a mass of reefs in the South channel.

The island of *Kageno* appears part of Koyaki, as it is only separated from its North point by a narrow boat-passage. The *Naginato* or *Hungry Rock*, which covers at high water, lies a cable East of its N.E. point, off which is a small islet.

Kamino Sima, at 6 cables North of Kageno, is the largest island on the northern side of the fairway to Nagasaki. Its North hill is elevated 330 feet, and on its central hill, which is lower, is a signal-staff. On the East side there is a small boat camber; on the S.W. the small flat island of *Siro sima*, on which there is a battery, is connected with a work on Kamino sima by a causeway of masonry.

North-westward of Siro sima are the two small islands *Aino sima* and

Mats sima. Aino sima, at $1\frac{1}{2}$ cable distance, is a flat table island on a reef, with a conspicuous rock * close off its South point; Mats sima, at 5 cables, is a small hill 90 feet high. There is deep water in the passage between Siro sima and Aino sima.

Barracouta Rock.—Off Kabuto saki, the S.E. point of Kamino sima, on which there is a battery, are some small islets. One cable from these, S.W. of the Tree Rock, and W. by N. of the South bluff of Papenburg, is the *Barracouta*, a sunken rock, which is the only hidden danger in the entrance, and may be cleared to the southward by keeping the summit of the coast range (800 feet) over Megami Point open of Papenburg, bearing East. The ship *Templeman* struck on a rock hereabout, if it was not the Barracouta Rock, on July 23, 1860. It was considered that the position did not agree with that of the latter, as given on the chart.

Papenburg, or *Takaboko*, 2 cables S.E. of Kamino sima, is the small precipitous island covered with dark foliage, which so well marks the entrance to the harbour. It may be passed at half a cable in 18 fathoms. To the N.E. of it, and distant one-third of a mile, is the small flat wooded island *Nizumi sima*,† lying off the small bay of *Kibatsu*, East of the large village of *Kosedo*.

The HARBOUR of NAGASAKI, an arm or inlet running in a north-easterly direction from the head of Nagasaki Bay, is large and commodious, thoroughly sheltered from all winds, and available for ships of all classes. From its entrance, which is a quarter of a mile wide between *Ogami Point* on the West and *Megami Point* on the East, it runs N.E. to the city a distance of 2 miles, increasing to a breadth (although irregularly, owing to several bays on its shores), of three-quarters of a mile. Above the city it narrows again, taking a northerly direction for another mile to its head, which is exceedingly shallow. The depths decrease gradually from 16 fathoms at the entrance to 3 fathoms off the city.

The only danger at the entrance is a sunken rock, supposed to lie about 70 yards South of the East extreme of *Ogami Point*. A temple stands on the South extreme of the point.

Megami Point is at the foot of a steep ridge, on which are three batteries, one above the other. Within *Megami Point* $1\frac{1}{2}$ cable (a small islet lying between them) is another point, on the extreme of which, in a battery, is a remarkable large tree.

The best anchorage for men-of-war is just above the British Consulate Bluff, large ships anchoring in 6 to 7 fathoms rather over towards *Minago*

* This rock or islet was the observing place of Sir Edward Belcher, in 1842, from which several meridian distances were measured to Lu-chu, Quelpart, &c.

† The observing place of Richards in 1856, from which meridian distances were measured to Hong Kong, Hakodate, &c.

*Point,** at this the broadest part of the deep water of the harbour. Merchant vessels usually anchor off the foreign settlement in 4 to 6 fathoms, or even above Desima in 3 fathoms. In the hot weather of July and August, great relief may be experienced from the closeness of the atmosphere, and it will be beneficial to the health of the crews, to spring the ship's broadside to the sea breeze, which, in fine weather, is almost constant from the S.W. and generally very fresh.

The *Hishiwo Bank*, which fronts the shore from Desima to the foreign settlement, is a good and convenient place for grounding. Its western edge is steep, but off Desima, W. by S. of the Dutch Consulate flagstaff, the bank is very flat. This is the spot recommended, especially for small vessels.

The harbour has three approaches. The principal one or fairway is directly from the N.W., the entrance of which, 4 miles outside the harbour, is between Fakuda saki and Iwo sima, and carries very deep water, 32 fathoms, decreasing to 20 in the passage between Papenburg and Kageno, and again to 15 and 16 fathoms at the entrance of the harbour.

The second approach is by the Oki Channel, between Oki sima and Koyaki, but it is only 3 cables in breadth, and further narrowed by the reefs which extend into the channel $1\frac{1}{2}$ cable from either shore. There are irregular soundings at 7 to 19 fathoms in it, and the best course through is midway between the reefs which are seen. Neither this channel nor its approaches have been yet thoroughly examined.

The third approach is by the South channel, between Koyaki and the main, and can only be used by steam-vessels. Narrow and intricate amongst the reefs, with soundings varying from 4 to 15 fathoms, it cannot be recommended, and can only be taken at the risk of the navigator.

THE CITY OF NAGASAKI, a treaty port, at present second only in importance to Yokohama, and the only place of trade open to foreigners between 1623 and 1857, covers a broad valley on the eastern side of the harbour, surrounded by lofty hills. Its population is increasing; in 1868 it amounted to nearly 70,000; in 1869, to 100,000. Of this population, on December 31st, 1868, there were 214 European and American residents (including 88 British, 35 American, 32 Dutch) and 629 Chinese; these last also were greatly on the increase. Nagasaki is one of the five imperial cities of Japan, and is under the jurisdiction of a governor holding his appointment from the Tycoon.

Desima, the historic site of the Dutch factory, projects into the harbour on the S.W. side of the city, to which it is only connected by a stone bridge. Shaped like the border of a fan, it is 250 yards in length and 80 in width,

* The rock on the South side of Minage Point, to which all the meridian distances are referred, is a convenient and quiet spot for taking observations.

and is traversed by a central street. Desima contains the residences and warehouses of the Dutch community, the consulate being situated at its S.W. angle. At the broad steps at its West end is the best place for landing at the city.

The Custom-house (Japanese) is situate directly East of Desima, but is not accessible to boats before a quarter-flood. The exports consist of tea, silk, coal, vegetable wax, gall nuts, copper, gold; also various articles for the Chinese market, as dried fish, sea slugs, sea weed, peas, beans, &c. The imports consist of manufactured goods, metals, and various articles of mixed merchandise, with the exception of munitions of war, which, by the 14th article of the treaty, can only be sold to the Japanese Government and to foreigners.

The Chinese community occupy the square secluded block of houses S.E. of Desima, connected with the shore by a bridge. They compose a trading guild and factory, subjected for ages to every kind of restriction; but, as said before, the Chinese population is increasing rapidly, and now carry on a brisk trade with the ports of China.

The foreign settlement is on the flat South of Desima, having a water frontage of 730 yards; it also stretches up the valley on the Owara Creek on the South. The British Consulate is upon the bluff South of this creek, where there is a good landing-place. There are also two landing-places in front of the settlement, but only the lower one can be approached at low water. The American, French, and Portuguese Consulates are on the hills at the back of the settlement.

A Patent Slip, erected through the energy of Messrs Glover and Co., was opened in January, 1869. It will prove of great advantage to vessels requiring to be docked.

Supplies.—All provisions are plentiful (mutton excepted), cheap, and easily obtained, as also is wood and water; the latter is brought off in boats to the shipping. Coal is abundant, at 9 to 11 dollars a ton, but is of very inferior quality for steaming purposes, especially for high-pressure boilers. There are numerous mines in the vicinity, one of which is in operation at Taka sima. There is a Japanese Government steam-factory at Akunora, on the West side of the harbour.

Pilots, either Japanese or European, can always be had at a charge of 30 dollars, obtained by requisition through the consul. It is said that they are well acquainted with their business, and that it is their custom to take entire charge of the navigation of the ship; but great caution should be used in this respect, as some of them have only knowledge of particular localities.*

* Mr. J. S. Compton, R.N., H.M.S. *Reynard*, 1861, remarks, that steaming during the night through the Suwo nada, the pilot in the morning was quite ignorant of the ship's position, "knowing nothing about the sea or the land."

TIDES.—It is high water, full and change, at Nagasaki, at 7^h 15^m; springs rise 9 feet, and neaps about 6 feet, but they are variable. The current in the harbour is always sluggish. A strong southerly wind is said to raise the level at high water at springs to 10 to 12 feet, or 2 feet above the ordinary level.

DIRECTIONS.—The entrance of Nagasaki, although safe of approach, is sometimes difficult for a stranger to make out from a distance, especially in clear weather, when the islands blend with the mainland; but on nearer approach or in slightly hazy weather when the islands appear in relief, the uncertainty is removed. It is said that vessels from the S.W. are very liable to make the entrance South of Iwo sima.

When making Nagasaki from S.W. or West, steer for the lighthouse and to round Signal Head, the North end of Iwo sima, at a quarter of a mile, not passing within a N.N.E. bearing of the head on approaching it, so as to avoid the bank off the dangerous Soto no hirase Rock. After rounding the head, steer E. $\frac{1}{2}$ S. for the Papenburg Bluff, passing it as closely as convenient, but taking care to avoid the Barracouta Rock; then E.N.E. for the entrance.

Passing in mid-channel between Ogami and Megami points, a N.E. course direct for the Dutch flag on Desima will then lead up in the best water, and when the factory of Akunora, on the West shore, opens of Minage Point, N. by W., a large vessel should haul up N.N.E., and anchor in 6 fathoms between it and the British Consulate or foreign settlement.

In approaching from the north-westward, the course from Hike sima is S.E. or S.E. $\frac{1}{2}$ E., according as it is passed on the East or West. Iwo sima will be made without difficulty (appearing end on, and under the mountain range Kawara yama, the highest on the Nagasaki peninsula), and should be passed on the North at a mile, when Papenburg will be seen over the three low islands outside Kamino sima.

There is little or no difficulty in getting into Nagasaki at night, if the weather be fine, unless it be extremely dark, especially if Signal Head (or the light if it is established) has been made; but should a vessel, from calms or adverse winds, be unable to enter, every endeavour should be made to get inside Papenburg if it be the intention to anchor, for outside this island the water is inconveniently deep, and it would be preferable to stand off and on till daylight, taking care not to decrease the soundings below 30 fathoms.

Anchorage can, however, be found in 20 to 26 fathoms over a bottom of thick green ooze with fine sand, good holding ground, or possibly rock or sand and shells if near the Hirase Rock. A vessel will lie here sheltered from all winds except N.W., but exposed to the swell from that quarter. There is also anchorage East of Papenburg and Kageno, in 13 to 17 fathoms, or in 11 fathoms on a bank S.W. of Megami Point; the bottom here is mud

and the shelter good except from West. Towards the eastern shore the ground is irregular and probably rocky.

EAST COAST OF NAGASAKI PENINSULA.—About 22 miles of the eastern side of the Nagasaki peninsula has been surveyed. It has generally a bold steep coast, but there are several places on it where a vessel blown to leeward of Cape Nomo by West winds, will find anchorage and good shelter from them.

Kabasima Bay, between Cape Nomo and Kabasima, the island 2 miles East of it, affords anchorage at its north-western part only open between S.E. and S.W. The eastern part of the bay, where a long sandy beach is seen, should be avoided, there being a sunken rock (Bay Rock), on which are 6 ft. water with 4 and 6 fathoms about it.

Misaki Bay, North of Kabasima and East of the low jutting point and sandy beach where stands the large village of Misaki affords anchorage in 7 to 11 fathoms. It is gained from the westward by rounding at not less than 2 cables distance, the South and S.E. points of Kabasima, the latter a steep head, from which steer to pass outside a low reef (East Rocks) 1 mile N. by E. of that head, which being passed, steer N.W. $\frac{1}{2}$ W. into Misaki bay, and anchor either in 10 fathoms East of the flat rocks, on which are seen a large bamboo erection used by the fishermen, whose nets it will require care to avoid.

Tameitsi Bay is $4\frac{1}{2}$ miles N.E. of Misaki. Steer for the village at its head, and when Kabasima shuts in behind the southern point of the bay, anchor in 10 fathoms or less, about 2 cables off shore. *Sitziwura*, a small bay 2 miles farther N.E., has anchorage in 9 to 10 fathoms, at 2 cables off shore.

Between Sitziwura and Mogi Bays, there are an islet and several large reefs which extend 2 or 3 cables from the shore.

Mogi, another small bay, is $5\frac{1}{2}$ miles N.E. of Tameitsi. Small craft can anchor in 3 to 6 fathoms, sheltered except from South to East; and larger vessels in 9 to 11 fathoms off the entrance.

Aba Bay, 3 miles N.E. of Mogi, and 15 miles from Kabasima, is rectangular in shape, $1\frac{1}{2}$ mile deep, and 1 mile in breadth. There is anchorage in the centre of the bay in 7 fathoms, open only between South and S.E. There is a boat camber at the village on the western side of the bay.

Maki sima, on the East side of Aba Bay, encloses on the N.E. a harbour for small vessels, having 10 to 12 feet water, accessible by two narrow passages.

SIMABARA GULF.—Of this large gulf, which extends 70 miles into the heart of Kiusiu, little is known. Simabara is a large and broad peninsula, so situated as to make this gulf an inland sea. On the eastern shore of the peninsula there stands a city of the same name. In the centre of the penin-

su a is an active volcano, a not high but extended mountain, over which a dark cloud of smoke usually rests. This is the focus of a wide volcanic region, and is associated with some of the severest earthquakes on record, one of which, in 1793, was felt throughout the whole of Kiusiu, and is said to have changed the configuration of the whole coast line of the adjoining province of Higo, and the general form of its territory.

A rock, reported by Captain Stevens, of the steam-ship *Filipino*, lies at the entrance of the gulf, and uncovers 5 feet at low water. It bears N. 20° W. from the East extreme of Tsuji-sima, and N. 64° W. from the East extreme of Gosima.

AMAKUSA, a large island 23 miles in length, lies S.S.W. of the Simabara peninsula; between them is the western entrance to the gulf, only 2½ miles in width. Two harbours, Tomioka and Kame ura on the western coast of Amakusa, have been examined by the Dutch.

Tomioka, E. ½ S. 14 miles from the South point of Kabasima, is a lagoon-like harbour on the eastern side of a small peninsula, which forms the N.W. point of Amakusa. The harbour is formed by a low tongue of land curving round to the westward and enclosing it, giving complete shelter, the entrance being from the S.E. by a channel carrying 5 fathoms water close along the South side of the low tree-covered tongue which forms the eastern side of the harbour. A vessel may anchor in the centre of the harbour, in 6 fathoms.

Kame ura, on the West coast of Amakusa, 13 miles S. by W. of Tomioka, is an inlet running in 5 miles West. There are three rocks north-westward of the entrance, the two eastern of which are pinnacles, the western low.

KOSIKI ISLANDS, consisting of two large and several small islands, extend in a N.E. and S.W. direction from lat. 31° 37' to 31° 53' N., and from long. 129° 41' to 130° 0' E. They are not high, but their appearance is bold in passing. The *Nadieja Rocks* off their West side are considered to be about 4 miles from the shore, and 7 miles North of Haya saki, their westernmost point.

The eastern point of *Kamino Kosiki*, the northern island, is distant about 13 miles from the coast of Kiusiu. Extending 2½ miles eastward of it, are several islets, the outer two of which are called *Futako sima*, the easternmost being a pinnacle rock.

Pioneer Rocks.—H.M.S. *Pioneer*, in 1861, when passing inside the Kosiki Islands, discovered two rocks lying 2½ to 3 miles eastward of the eastern of the two *Futako islets*, with Dasima saki bearing S.E. ½ E. They are close together, 10 to 12 feet above water, and dangerous from their smallness. The Japanese manuscript chart also represents a rock or islet (the *Kamome sima*) off the coast to the E.S.E., and a danger of some sort farther out; the

passage eastward of the Pioneer Rocks seems therefore one that should be avoided at night or in bad weather, until more be known of it.

Taka Sima.—S. by E. 10 miles of Nasaki, the South point of the Kosiki group, are the Taka sima or *Symplegades*. They are described as three islets forming a triangle, the sides of which are each not more than a cable in extent. A rock awash was observed lying a quarter of a mile southward of the group.

The *Tsukarase* or *Retribution Rocks*, three in number, were discovered by H.M.S. *Retribution*, August 6th, 1858. They lie in line North and South, about 2 cables apart, in lat. $31^{\circ} 20' N.$, long. $129^{\circ} 46' E.$ The two southernmost rocks rise in a needle form about 60 feet above the sea; the northern rock is flat, and only 10 feet high.

Udai sima, or *Rycho Poncié Group*,* consist of one island, with some rocks and islets surrounding it. The island is 2 miles in circumference, the western part somewhat flat, but the eastern rising in a precipitous peak, to the height of 1,060 feet above the sea. It is in lat $31^{\circ} 12' N.$, long. $129^{\circ} 29' E.$ Two and a half and one mile respectively to the S.W. of the island are two small islets; and to the eastward of its peak, about a mile, is another islet.†

MEAC SIMA GROUP.—The relative positions of the Meac sima or *Asses Ears Group* and Pallas Rocks, were determined by H.M.S. *Saracen*, in 1855. The Meac sima, consisting of two islands, with intermediate smaller islands and rocks, cover an extent of nearly 4 miles in a N.E. and S.W. direction. The approach to them from the northward is quite clear. Between the Asses Ears and Pallas Rocks the ground is pretty even, and the general depth about 81 fathoms.

Taka Sima, the north-east island, is nearly $1\frac{1}{2}$ miles long, and three-quarters of a mile wide. It is elevated 618 feet above the sea, and is somewhat level at the top, with cliffy precipitous sides, excepting to the southward.

Kusa-kaki, the S.W. island, is less than half the size of the N.E. island, but 100 feet higher and very craggy; its remarkable peak probably suggested the name of the group to its first discoverers.

Me sima and **Wo sima**, the intermediate small islands and rocks, are high and cliffy, the latter partaking generally of the sugar-loaf form.

* Thus named (and deservedly so, if a European name is admissible), after the Ingénieur-hydrographe of the French Expedition under Admiral Cecille in 1846.

† The Udai sima are high, and of considerable extent. The easternmost island appeared larger and its position to be farther North than marked in the chart; no foul ground was visible near them.—Stephen Court, Master of H.M.S. *Furious*, 1858.

The only outlying rocks noticed extend South about a third of a mile from the south-west island, and may be almost considered part of the main group.

PALLAS ROCKS are three in number, two of which lie close together, and one N.E. $1\frac{1}{2}$ cable from the largest, which is the south-western of the group. The largest rock does not exceed a third of a cable in diameter, and is about 60 feet high; the other two are about one half that elevation. They are steep-to, and soundings were obtained at the distance of a mile South from them, in 95 fathoms, sand and shells. The largest rock is in lat. $32^{\circ} 14' 17''$ N., long. $128^{\circ} 12' 30''$ E.

DIRECTIONS.—When leaving the Yang-tse kiang for the Japan Islands, if bound to Nagasaki, a course may at once be steered for Meac sima or Asses Ears Group, the highest island of which is visible in clear weather upwards of 30 miles. With the Asses Ears bearing South 8 miles, an E.N.E. course for 75 miles will place a vessel off Signal Head, the North point of Iwo sima, at the entrance of Nagasaki, which on near approach should not be brought to bear northward of N.N.E. For entering Nagasaki, see page 679.

The direct course from the Amherst Rocks to Nagasaki is E. by N. easterly 390 miles, and leads midway between the Pallas Rocks and Cape Goto; but the danger of steering is, that the vessel in some part of her course must pass across that arm of the Japan stream which sets through Korea Strait into the Japan Sea, and experience a set which may carry her to the northward of Cape Goto. The current will generally be found between the meridians of 125° and 127° , or even two degrees broader, its direction N.E. by N., and its velocity from a quarter to three-quarters of a knot per hour. It is evident, therefore, that its effect will be dependent on the speed of the vessel, and also that if no sights can be obtained her position will be uncertain within these limits.*

With these considerations the navigator must act on his own judgment, there being only difficulty in making the passage, when baffling winds, and

* Mr. J. S. Compton, Master of H.M.S. *Renard*, states that he found the current between Nagasaki and Shanghai set generally with the wind. Mr. J. H. Lawrence, Master of H.M.S. *Pearl*, records a set of 24 miles, N.E. by N., on June 29, 1862, and N. by E. 19 miles the next day, nearer to Kiusiu.

with a fair wind, which it may be almost surely inferred will be but of short duration. There is great probability that a vessel kept on the starboard tack would be set over to the Korean Archipelago.

If bound from the southern ports of China, or from the eastward of Formosa, a direct course should be steered for Nagasaki, there being good sea-room (70 miles) between the Meac sima and Udsi sima, but precaution should be taken in the latter case against being set to the eastward by the strong current through Van Diemen Strait.

Through KOREA STRAIT.—If bound on to Hakodati at the same season or even as late as the end of June, it will be found difficult with a sailing vessel to make easting at all along the West coast of Nipon. It will be advantageous to pass well East of Tsu sima in the strength of the Japan Stream which sets N.E. by North through the Korea Strait, attaining at times, although not constant, a velocity of 2 knots an hour. Should a S.W. wind occur at this season, it may be expected to last only 24 hours, unless it follow an easterly gale with depressed barometer. If the weather at the time be very fine, and, instead, be followed by a calm and falling barometer, a cyclone of more or less violence and duration may be expected, lasting from one to seven days. It sets in with an East or south-east wind, accompanied by dirty weather, and generally shifts suddenly to South or north-west. Easting should, therefore, be made whenever possible.

During the winter, gales from North and N.W. are very frequent in the Korea Strait, lasting three or four days, and are sometimes violent. A rapidly falling barometer indicates their approach, the wind increasing in force after the mercury commences to rise, and not attaining its height until 24 hours after. In such weather, if making for Nagasaki on the port tack, beware of being blown to leeward into Van Diemen Strait, for if set through by the Japan stream, it will take a long time to regain the lost ground against the current (one vessel having been nearly three weeks endeavouring to beat round Cape Chichakoff); and if on the starboard tack, there is probability of being set up the Korea Strait to the northward of Cape Goto. As both cases have happened to vessels, it is recommended that they should endeavour to make the land in daylight, and find anchorages, or secure a knowledge of their position.

In winter, when N.W. and West winds prevail, a direct course should be steered from the Korea Strait when bound to Hakodate; but if bound from thick, rainy and squally weather are met with in the vicinity of the Meac sima, the Pallas, or the Goto Islands, or they are passed on dark nights. If not therefore sure of the vessel's position, it would be well to make them in the day time, unless the nights are moderately fine.

During the periodic easterly winds, which prevail from March to June, with a sailing vessel, every opportunity must be taken to make easting, even

Hakodate southward, it is necessary to endeavour to make westing when possible, and keep a long offing, for the coast of Nipon is a lee shore. After passing Korea Strait as well to windward as possible, the winds will be found more liable to change when arrived at lat 32° N., long. 125° E., but sometimes they continue so steadily between N.W. and W.S.W., as to set a vessel to leeward of the Yang-tse.

NAGASAKI to the INLAND SEA.—In passing through the archipelago which encircles the western coast of Kiusiu, there are not more islands than just sufficient as good marks in thick weather. Their coasts are bold; anchorages abound and can be safely run for almost everywhere; and an offing may generally be made before nightfall, should that or the approach of thick or stormy weather render it desirable. The tides are regular within the islands. Outside, the north-east stream is almost constant in the offing.

If proceeding *outside* Hirado, after leaving Nagasaki, steer N.W., unless wishing to pass outside Hiki sima. A run of 16 miles will place a ship abreast that island, and a further run of 13 miles on the same course will lead up mid-channel between Oate and Yeno sima, from which position a N.N.W. course for 11 miles will reach the islets off the S.W. point of Hirado. Pass a mile outside these islets, and also of the Aska sima 3 miles North of them, unless intending to take the Obree channel (page 668), in which case pass inside the Aska sima, and steer directly for it.

Coasting Hirado and Ikutski on a N.N.E. course, a run of $12\frac{1}{2}$ miles from Aska sima, will place a vessel off the North point of Ikutski; then steer N.E. by E. for 7 miles until past the small rock off the north-western face of Atsusi no Oosima, which, if not seen, may be cleared by keeping Madara quite open to the westward of Atsusi on passing. An E.N.E. course will now lead direct to Wilson Island distant 52 miles, passing 2 miles north-westward of Madara, of Yebosi, and of the Swain Reef, and when Wilson Island is well risen, shape the course to pass to the westward of it.

If at night, it were better to steer from Yebosi such a course as would give Swain Reef a wider berth, being careful lest the eastern tidal stream into the strait of Simonoseki, which sets rather strongly through the channels East of Wilson Island, should saddle the vessel on to that reef.

THROUGH SPEX STRAIT.—The inner passage from Nagasaki to the Inland Sea by Spex or Hirado Strait, is 15 miles less in distance than that outside Hirado, but it is seldom that a vessel is not obliged to anchor somewhere for the night. From the entrance of Nagasaki, steer N.W., as before, to pass between the pinnacle rocks of Hiki and Sumo, and round the western side of all the groups North of Hiki; then shape the course North to N. by E. to pass eastward of Kuro sima, and four beautifully cultivated islands to the North of it, lying in the southern entrance to Spex Strait.

When abreast of Kuro sima, and distant about half a mile, steer N. by W. $\frac{1}{2}$ W. until Table mountain, a remarkable flat-topped mountain some distance back from the shore of Kiusiu, bears E. $\frac{1}{2}$ S. If this course is made good, it will carry you clear of Robinet Rock and midway between it and the Kiusiu shore. Do not bring the northern Kareki Islet to bear to the southward of S.S.W. $\frac{1}{2}$ W. till Table mountain bears East. When Table mountain bears E. $\frac{1}{2}$ S., steer N. by E. $\frac{1}{2}$ E., till abreast of the anchorage of Kawatchi, when Red Cliff will be plainly seen, then steer about N.E. by N. to pass around Red Cliff, keeping well over to the eastern side of the channel. Keep along the eastern shore, a cable and a half distant, till around Low Point, and abreast of Kuro-ko sima.

When abreast of Kuro-ko sima, to avoid Vineta Rock steer directly for Rocky Island or the rocks awash, taking care to keep Rocky Island well open to the left of the rocks awash and Low Point to the eastward of S. by E. $\frac{1}{2}$ E. When Furasato Saki bears about S.E. $\frac{1}{2}$ E., steer so as to pass at least one cable to the eastward of the rocks awash. In going South through the straits, steer directly for Kuro-ko sima, heading about S. by W. $\frac{1}{2}$ W., and keeping it to the southward of S.S.W. $\frac{1}{2}$ W. till Furasato Saki bears about West, when steer for Low Point and through the rest of the strait the same as in coming to the northward.

Four-foot rock at the southern end of the strait is easily seen and recognized.

Vineta Rock, so named from H.P.M. ship *Vineta* striking on it, has 15 feet water on it at low water. It is the only known danger, and is important from being directly in the fairway through the strait.

The two dangers, marked E.D., probably do not exist, as the U.S.S. *Monocacy's* boats were unable to find them.

Robinet Rock, which is only two-thirds to three-quarters of a mile N. by E. $\frac{1}{2}$ E. from the North Kareki, can also be avoided by keeping in mid-channel between Hirado Sima and the Kareki Islets.

Vineta Rock can also be safely passed to the eastward by keeping well towards the main land of Kiusiu on a course of N. $\frac{1}{2}$ E., after passing close to Low Point, until the North point of Furasato Saki bears S.E. by E., when the danger will be passed. But as this channel is narrow, the other is thought to be preferable.—(Lieut.-Commander S. A. Mc Carty, U.S.N., 1867.)

When clear of the northern entrance of the strait, the course along the land is N.E. by E. to Hato saki, distant 17 miles, steering for the clump beyond it which is on the East bluff of Ogawa, the eastern of the three islands North of Hato saki and Yobuko, and passing between the bluff and the Passage rocks. The same course will lead well outside the Dove and Ellis Reefs, which are 3 miles off shore, and may both be covered, and outside but rather close to the Swain Reef.

Another track may be pursued from Spex Strait, steering from it on a N.E. $\frac{1}{4}$ E. course to pass between Madara and Kagara, and rounding the N.W. point of the latter at a mile; from this a N.E. by E. $\frac{1}{2}$ E. course will lead up close to the West point of Wilson Island, passing half a mile outside Yebosi.

Should the passage have been made by the Korea Strait, after rounding the North point of Iki, an E. $\frac{1}{4}$ N. course may be steered for the Siro simas at the entrance of the Inland Sea, passing well northward of Orono sima with a clear run of 55 miles. The tidal streams here are not very well known.

The JAPANESE CURRENT.—In the chapter devoted to the currents this remarkable stream will be more particularly described in its extent, but a few words here will form a fitting conclusion to this description of the Japan Archipelago.

On the Japanese charts the current is noticed as passing eastward off the S.E. coast of Nipon, and is called *Kuro Siwo*, or the Black Stream, or *Kurosegawa*, the current of the Black Gulf. It was noticed by all early navigators, and more extended observation has shown its exact analogy with the Gulf Stream of the Atlantic. The following is from the China Pilot.

The Kuro Siwo, or Japan Stream, is an immense oceanic current, which from observations appears to have its origin in the great equatorial current of the Pacific, from which ocean it is separated by the South end of Formosa. The larger portion of this current, when it reaches the point just named, passes off into the China Sea; while the other part is deflected to the northward along the eastern coast of Formosa until reaching the parallel of 26° N., when it bears off to the northward and eastward, washing the whole S.E. coasts of Japan, and increasing in strength as it advances to a limit which appears to be variable.

Near its origin the stream is contracted, and is usually confined between Formosa and the Meiao-sima group, with a width of nearly 100 miles; but to the northward of the latter it rapidly expands on its southern limit, and reaches the Lu-chu and Bonin Islands, attaining a width to the northward of the latter of about 400 miles. Its average maximum temperature is 86° , which differs about 12° from that of the ocean due to the latitude. The north-western edge of the stream is strongly marked by a sudden thermal change in the water of from 10° to 20° ; but the southern and eastern limit is less distinctly defined, there being a gradual thermal approximation of the air and water.

Along the borders of the stream, where it chafes against the counter currents and torpid waters of the ocean, as also in its midst, where whirls and eddies are produced by islands and the inequalities in its bed, strong tide rips are encountered, often resembling heavy breakers on reefs or shoals.

Its average velocity between the South end of Formosa and Tsugar Strait has been found to be from 35 to 40 miles in 24 hours.

This current is, however, much influenced, both in direction and velocity, by local causes. It is sometimes* entirely checked for a day by a N.E. wind; when it may be again expected to resume its former course, and possibly run with greater rapidity than usual for one or two days. One occasion, off the Gulf of Yedo, its maximum strength is recorded as high as 72, 74, and 80 miles respectively, on three successive days.† But at other times some observations have shown results greatly at variance with the generally received accounts of it.

According to Captain Charles Bullock, R.N., a branch of the Kuro Siwo holds on its N.E. by N. course from Formosa, though with mitigated strength, and passes through the Korea Strait into the Japan Sea, having split upon the South point of Tsushima. From this it becomes very uncertain and variable in force and direction, sometimes stretching northwards to Dagelet at the rate of 2 knots per hour, at other times it appears quite dissipated; still there is much reason to suppose it holds its way on to the Strait of Tsugar, through which it is again observed flowing steadily into the Pacific.

* But not always, H.M.S. *Centaur*, in August, 1861, having been drifted 53 miles in 24 hours, in the face of a strong E.N.E. gale, between 136° and 137° E.

† The current seems to attain its greatest velocity between Van Diemen Strait and the Gulf of Yedo, but was recorded on one occasion as only 24 to 27 miles on three successive days. It is sometimes deflected to the South by the chain of islands South off the Gulf, or before reaching them. Changes in the stream will probably be found dependent on the seasons.

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SECTION III.

THE ISLANDS OF THE NORTH PACIFIC OCEAN.

IN the companion volume to this—that describing the South Pacific Ocean—allusion has been made to the imperfect notion that is given by inspecting a map, of the importance and relative size of the innumerable islands which are scattered over these oceans. In many instances the minute coral spot, which makes a considerable feature on the chart, could not be visibly represented of its proper dimensions; and this exaggeration is enhanced by the several names by which it is distinguished, which seem to add to its size and area. By far the greater number of islets are of this coral formation. A few of the well known groups are volcanic, lofty, and of considerable dimensions; but the aggregate area of the dry land of the coral islands is remarkably small. In most instances it is a mere strip surrounding the central lagoon, but of surpassing fertility, and supporting an immense population in proportion to the actual area.

With a large proportion of the groups we are sufficiently intimate to affirm that they are tolerably well represented; but in the greatest number of instances they have not been so accurately surveyed as they ought to be, and the sameness of their character renders this remark of the more importance, as it is difficult in many instances to distinguish between small spots which so much resemble each other. In the ensuing lists and descriptions we have stated the authority on which the descriptions and the geographical position depend.*

As the structure, growth, and foundation of the coral islands is among the most wonderful of all natural problems, we give here some extracts from the

* In this edition it has not been thought necessary to repeat the quotations of the authorities which were given *in extenso* in the first edition. To that work we, therefore, refer the reader who may be interested in the history of the hydrography of the Pacific.

North Pacific.

work of Charles Darwin, Esq., who, while he accompanied the late Admiral FitzRoy in the expedition in the *Beagle*, accumulated those stores of knowledge which he has made such abundant use of in later years. We confine the extracts strictly to those remarks bearing on the structure of the coral islands.

Mr. Darwin says:—I will now give a very brief account of the three great classes of coral reefs, namely, Atolls, Barrier, and Fringing Reefs, and will explain my views on their formation. Almost every voyager who has crossed the Pacific has expressed his unbounded astonishment at the lagoon islands, or as I shall for the future call them by their Indian name of Atolls, and has attempted some explanation. Even as long ago as the year 1605, Pyrard de Laval well exclaimed, "C'est une merveille de voir chacun de ces atollons, entouré d'un grand banc de pierre tout autour, n'y ayant point d'artifice humain." The immensity of the ocean, the fury of the breakers, contrasted with the lowness of the land and the smoothness of the bright green water within the lagoon, can hardly be imagined without having been seen.

In previous theories a most important consideration has been overlooked, namely, on what have the reef building corals, which cannot live at a great depth, based their massive structures.

Numerous soundings were carefully taken by Captain FitzRoy on the steep outside of Keeling atoll, and it was found that within 10 fathoms the prepared tallow at the bottom of the lead invariably came up marked with the impression of living corals, but as perfectly clean as if it had dropped on a carpet of turf; as the depth increased the impressions became less numerous, but the adhering particles of sand more and more numerous, until at last it was evident that the bottom consisted of a smooth sandy layer; to carry on the analogy of the turf, the blades of grass grew thinner and thinner, till at last the soil was so sterile that nothing sprang from it. From these observations, confirmed by many others, it may be safely inferred that the utmost depth at which the corals can construct reefs is between 20 and 30 fathoms. Now there are enormous areas in the Pacific and Indian Oceans, in which every single island is of coral formation, and is raised only to that height to which the waves can throw up fragments, and the winds pile up sand.

From the fact of the reef-building corals not living at great depths, it is absolutely certain that throughout vast areas, wherever there is now an atoll, a foundation must have originally existed within a depth of from 20 to 30 fathoms from the surface. It is improbable in the highest degree that broad, lofty, isolated, steep-sided banks of sediment arranged in groups and lines hundreds of leagues in length, could have been deposited in the central and profoundest parts of the Pacific and Indian Oceans at an immense distance from any continent, and where the water is quite limpid. It is equally improbable that the elevatory forces should have uplifted, throughout the above vast areas, innumerable great rocky banks within 20 to 30 fathoms, or 120 to 180 feet of the surface of the sea, and not one single point above that level; for where, on the whole face of the globe, can we find a single chain of mountains, even a few hundred miles in length, with their many summits rising within a few feet of a given level, and not one pinnacle above it? If, then, the foundation whence the atoll-building corals spring, were not formed of sediment, and if they were not lifted up to the required level, they must of necessity have subsided into it; and this at once solves the difficulty. For as mountain after mountain, and island after island, slowly sank beneath the water, fresh bases would be successively afforded for the growth of the corals.

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THE ISLANDS OF THE NORTH PACIFIC OCEAN. 691

the second great class, namely, Barrier Reefs. These either extend in straight lines in front of the shores of a continent or of a large island, or they encircle smaller islands; in both cases being separated from the land by a broad and rather deep channel of water, analogous to the lagoon within an atoll. It is remarkable how little attention has been paid to encircling barrier reefs, yet they are truly wonderful structures. In the Island of Bola-Bola the whole line of reef has been converted into land; but usually a snow-white line of great breakers, with only here and there a single low islet crowned with cocoa-nut trees, divides the dark heaving waters of the ocean from the light green expanse of the lagoon channel. And the quiet waters of this channel generally bathe a fringe of low alluvial soil loaded with the most beautiful productions of the tropics, and lying at the foot of the wild, abrupt, central mountains. Encircling barrier reefs are of all sizes, from 3 miles to no less than 44 miles in diameter; that which fronts one side, and encircles both ends of New Caledonia is 400 miles long. The depth within the lagoon channel also varies much: from 10 to 13 fathoms may be taken as an average; but at Vanikoro there are spaces no less than 56 fathoms, or 336 feet deep. Internally the reef either slopes gently into the lagoon channel, or ends in a perpendicular wall sometimes between 200 or 300 feet under water in height; externally the reef rises, like an atoll, with extreme abruptness out of the profound depths of the ocean. What can be more singular than these structures? We see an island, which may be compared to a castle situated on the summit of a lofty submarine mountain, protected by a great wall of coral rock, always steep externally, and sometimes internally, with a broad level summit, here and there breached by narrow gateways, through which the largest ship can enter the wide and deep encircling moat.

As far as the actual reef of coral is concerned there is not the smallest difference in general size and outline, grouping, and even in quite trifling details of structure, in a barrier and an atoll. The geographer Balbi has well remarked that an encircled island is an atoll, with high land rising out of its lagoon: remove the land, and a perfect atoll is left.

But what has caused these reefs to spring up at such great distances from the shores of the included islands? It cannot be that the corals will not grow close to the land; for the shores within the lagoon channel, when not surrounded by alluvial soil, are often fringed by living reefs; and we shall presently see that there is a whole class, which I have called Fringing Reefs, from their close attachment to the shores both of continents and of islands. Again, on what have the reef-building corals, which cannot live at great depths, based their encircling structures? This is a great apparent difficulty, analogous to that in the case of atolls, which has generally been overlooked.

On what are these barrier reefs based? Are we to suppose that each island is surrounded by a collar-like submarine ledge of rock, or by a great bank of sediment ending abruptly where the reef ends? If the sea had formerly eaten deeply into the islands before they were protected by the reefs, thus having left a shallow ledge round them under water, the present shores would have invariably been bounded by great precipices; but this is very rarely the case. Moreover, on this notion, it is not possible to explain why the corals should have sprung up, like a wall, from the extreme outer margin of the ledge, often leaving a broad space of water within, too deep for the growth of corals. The accumulation of a wide bank of sediment all around these islands, and generally widest where the included islands are smallest, is highly improbable, considering their exposed positions in the central and deepest parts of the ocean. On what then are these barrier reefs based? Why, with their wide and deep moat-like channels, do they stand so far from the included land? We shall soon see how these difficulties disappear.

We come now to the third class of fringing reefs, which will require a very short notice. Where the land slopes abruptly under water, these reefs are only a few yards in width,

forming a mere ribbon or fringe round the shores; where the land slopes gently under the water, the reef extends further, sometimes as much as a mile from the land; but in such cases the soundings outside the reef always show that the submarine prolongation of the land is gently inclined. In fact, the reefs extend only to that distance from the shore at which a foundation within the requisite depth, from 20 to 30 fathoms, is found. As far as the actual reef is concerned, there is no essential difference between it and that forming a barrier or an atoll; it is, however, generally of a less width, and consequently few islets have been formed on it. From the corals growing more vigorously on the outside, and from the noxious effect of the sediment washed inwards, the outward edge of the reef is the highest part, and between it and the land there is generally a shallow sandy channel a few feet in depth. Where banks of sediment have accumulated near to the surface, as in parts of the West Indies, they sometimes become fringed with corals, and hence in some degree resemble lagoon islands or atolls; in the same manner as fringing reefs, surrounding gently sloping islands, in some degree resemble barrier reefs.

No theory on the formation of coral reefs can be considered satisfactory which does not include the three great classes. We have seen that we are driven to believe in the subsidence of those vast areas, interspersed with low islands, of which not one rises above the height to which the wind and waves can throw up matter, and yet constructed by animals requiring a foundation, and that foundation to lie at no great depth. Let us, then, take an island surrounded by *fringing reefs*, which offer no difficulty in their structure, and let this island with its reef slowly subside. Now, as the island sinks down, either a few feet at a time or quite insensibly, we may safely infer, from what is known of the conditions favourable to the growth of coral, that the living masses, bathed by the surf on the margin of the reef, will soon regain the surface. The water, however, will encroach a little by little on the shore, the island becoming lower and smaller, and the space between the inner edge of the reef and the beach proportionably broader. Coral islets are supposed to have been formed on the reef; and a ship is anchored in the lagoon channel. This channel will be more or less deep, according to the rate of subsidence, to the amount of sediment accumulated in it, and to the growth of the delicately branch corals which can live there. We can now see why encircling barrier reefs stand so far from the shores which they front. We can also perceive that a line drawn perpendicularly down from the outer edge of the new reef to the foundation of solid rock beneath the old fringing reef will exceed, by as many feet as there have been feet of subsidence, that small limit of depth at which the effective corals can live; the little architects have built up their great wall-like mass, as the whole sank down, upon a basis formed of other corals and their consolidated fragments. Thus the difficulty on this head, which appeared so great, disappears.

If instead of an island we had taken the shore of a continent fringed with reefs, and have imagined it to have subsided, a great straight barrier, like that of Australia or New Caledonia, separated from the land by a wide and deep channel, would evidently have been the result.

Let us take our new encircling barrier reef, and let it go on subsiding. As the barrier reef slowly sinks down, the corals will go on vigorously growing upwards; but as the island sinks, the water will gain inch by inch on the shore, the separate mountains first forming separate islands with one great reef, and finally the last and highest pinnacle disappearing. The instant this takes place a perfect atoll is formed. I have said, remove the high land from within an encircling barrier reef and an atoll is left, and the land has been removed. We can now perceive how it comes that atolls, having sprung from encircling barrier reefs, resemble them in general size, form in the manner in which they are grouped together, and in their arrangement in single or double lines; for they may be called rude outline charts of the sunken island over which they stand. We can further see how it

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arises that the atolls in the Pacific and Indian Oceans extend in lines parallel to the prevailing strike of the high island and great coast lines of those oceans. I venture, therefore, to affirm, that on the theory of the upward growth of the corals during the sinking of the land, all the leading features in those wonderful structures, the lagoon islands or atolls, which have so long excited the attention of voyagers, as well as in the no less wonderful barrier reefs, whether encircling small islands or stretching for hundreds of miles along the shores of a continent, are simply explained.

The arrangement of the following pages is similar to that pursued in the volume on the South Pacific, viz., the islands and groups are described in belts of latitude, each 10° in width, and proceed from the eastern side to the western side of the ocean in succession, commencing in this work with the Equator.

CHAPTER XII.

ISLANDS BETWEEN THE EQUATOR AND LAT. 10° N.

FOLLOWING the plan adopted in the South Pacific Directory, we commence from the coast of America, and include in this chapter the group of islands, the Gilbert Archipelago, which lie on the Equator, the Marshall Archipelago to the North of it, and the Caroline Archipelago, lying within the same belt of latitude.

MALPELO ISLAND, in lat. 4° 3' N., long. 81° 36' W., according to Commander Aldham, H.M.S. *Swift*, July 22, 1851, is a barren, high, perpendicular rock, which may be seen in clear weather at the distance of 20 leagues, the summit being 1,200 feet above the sea level. A small quantity of green moss, and a few dwarf bushes, which grow in its cracks and gulleys, afford the only verdure that it possesses. It is surrounded with islets, and the whole may extend about 9 or 10 miles from North to South. The centre of this island bears a resemblance, in several points of view, to the crown of a head, and its being barren accounts naturally enough for the name (bald head) which the Spaniards have bestowed on it. It is surrounded, as it were, by a strong current, having much the appearance of breakers, which, setting into the gulf, and, being accompanied by light winds, with thick and hazy weather, Colnett did not think it deserving of any further attention. The current was found to set N.E. by E. 2½ miles an hour. Another statement is made that they run violently to the southward and westward near it, a difference possibly owing to the different seasons they have been observed in. Colnett's was in July, 1793. The rock itself has 40 fathoms alongside of it, and 110 fathoms at a quarter of a mile distant.

RIVADENEYRA SHOAL.—"Being on board the steamer *Peru*, abreast of Puná, October 22, 1842, and hearing that there was a terrible yellow fever raging at Guayaquil, the steamer put back, and I was placed on board a small schooner going to Realejo. On the 28th, in the middle of the day, the sea calm, we had caught a large turtle, when I observed at a few fathoms off a slight swell on the sea; we took the boat and went to it, when we sounded, and, to our astonishment, found only 16½ feet (French?) of

water. In the centre of this circular spot was only 10 feet depth; we then found 14, 16, 27, 56 feet, and then no bottom. By our very imperfect instruments we made it to be in lat. $4^{\circ} 15' N.$, long. $85^{\circ} 10' W.$ of Greenwich; but this we considered nearly correct, as we hastened on to Realejo."

The existence of this bank has been in some degree confirmed by the enquiries of Captain Lapelin, in the French corvette *La Brillante*, in 1852. He ascertained that several vessels had struck on it, but did not gain any information as to the correctness of the position assigned. Captain Harvey, of H.M.S. *Havannah*, passed within 4 miles of the place in July, 1857, without seeing anything of it.

COCOS ISLAND.—The discovery of this island is involved in obscurity. It is mentioned as being well known by early navigators, Lionel Wafer, Dampier, &c. Its more exact position and character appear to have been first ascertained by the Spanish exploring ships, the *Descubierta* and *Atrevida*, in 1791. It was then visited, and, it is stated, surveyed, by Captain Colnett in 1793. In 1795 it was visited by Vancouver, who also examined it. There are some singular discrepancies in the accounts given by these different visitors, more particularly in those of the two last named. Vancouver states it to be $4\frac{1}{2}$ miles in length N.E. and S.W., while Colnett states it to be 12 miles; and the respective plans given also coincide with the descriptions. These discrepancies were decided in Vancouver's favour by Sir Edw. Belcher in 1838. He places the observatory at the head of Chatham Bay, at the N.E. part of the island, in lat. $5^{\circ} 32' 57'' N.$, long. $86^{\circ} 58' 22'' W.$

The island, according to Mr. Whidbey's account, is about 4 leagues in circuit, with several detached rocks and islets scattered around its shores. Off the S.W. point they extend to the greatest distance, nearly 2 miles, and would be dangerous if they were not sufficiently high to be seen and avoided.

The island itself is very high, sufficiently so to be seen at more than 20 leagues distant; and Vancouver says that he lost sight of it at 46 miles W.N.W., not from sinking below the horizon, but from being obscured by haze. The West side is the highest, showing in the form of a round hill, descending the northern extremity, which appears like a detached islet when bearing to the eastward. From this quarter the southern part appears to rise abruptly from the sea, in steep rugged cliffs, to a considerable height. The northern side is indented into small bays, with rocks and islets lying near them. The shores are chiefly composed of broken cliffy perpendicular precipices, beyond which the surface rises unevenly to the summit of the island, the whole composed of one rude connected thicket of small trees, near the shore; but on the more elevated and interior parts of the island are many large spreading trees, among which are cocoa-nut trees, but not in such abundance as to distinguish the island.

LAT. $10^{\circ} N.$

ectory, we commence the group of islands, the Marshall Archipelago, lying within the

V., according to Comarren, high, perpendicular distance of 20 leagues, small quantity of green rocks and gulley, afford with islets, and the South. The centre of view, to the crown of a ch for the name (bald t is surrounded, as it ce of breakers, which, winds, with thick and any further attention. hour. Another state- l and westward near it, ey have been observed s 40 fathoms alongside

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The one great advantage which Cocos Island offers, is the abundance of fresh water. Apparently it is quite pure, and is very easily to be procured at those points to which vessels can resort. Fish are abundant around the shores, but would not take bait; sharks in large shoals, and very voracious, are among the number. Fowl of the oceanic kind visit the island, and afford tolerable food. The cocoa-nuts, also, have been of great service to earlier navigators.* All the trees for fuel have been cut, and there are no cocoa-nut trees remaining which are accessible. Pigs are abundant.

Chatham Bay is the easternmost anchorage on the island. Vancouver moored here in 33 fathoms, sand and gravel, good holding ground and free from rocks. The East point of the bay, which is a small conical islet close to the N.E. extreme of the island, bears N. 51° E., half a mile distant; West point of the bay, S. 75° W.; a steep rocky islet lying off it from S. 87° W. to N. 66° W.; and the watering place at the mouth of a very fine stream emptying itself over a sandy beach, S. 13° W., about three-quarters of a mile distant. Outside this the water deepens almost immediately. This bay is quite open to the North, and Colnett states that though he found the prevalent winds to be from South and West, he had it frequently strong from N.E. and North.

Wafer Bay, as it is named in Colnett's plan, is to the westward of the former, and 1 mile distant from the N.E. point; it may be easily known by a small rugged barren rock, about the size of a large boat, bearing West of the body of the bay about 5 or 6 miles. The bay also lies East and West, but is not adapted for vessels of above 200 tons; it is nearly sheltered from all winds. Vancouver says it is certainly not so eligible a situation for procuring the good things the island affords as the bay to the eastward, although a more copious stream of water flows into it.

The climate of the island is humid. Vancouver considered it (January) temperate and salubrious, but had heavy rains. Colnett, who stayed longer, experienced almost constant and very heavy rain. Flies, too, were very abundant and annoying.

The tide is an important object in anchoring here. The time of high water is about 2^h 10^m, rising and falling from 16 to 18 feet. The ebb sets to the East at the rate of 4 or 5 knots. The flood, which is weaker, runs to the West. They are uninfluenced by currents. The current around is strong and irregular, but generally setting to the north-eastward at the rate of 2 knots.†

* Colnett states that his men drank an excessive quantity of the milk, which did not intoxicate, but so benumbed them that they were unable to move without assistance; this continued for four or five days.—*Voyage to the South Seas*, pp. 67-8.

† DOUBTFUL ISLANDS.—Of *Gallego Island*, in lat. 1° 8' N., long. 104° W., nothing is known.

Duncan Island, discovered in 1787, it is said, by Captain Duncan, in a merchant vessel

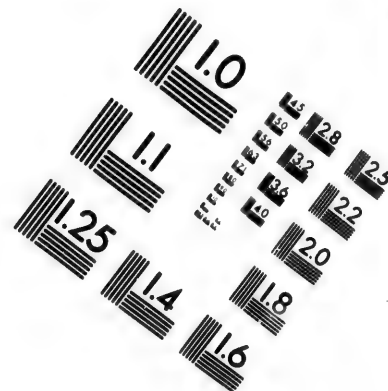
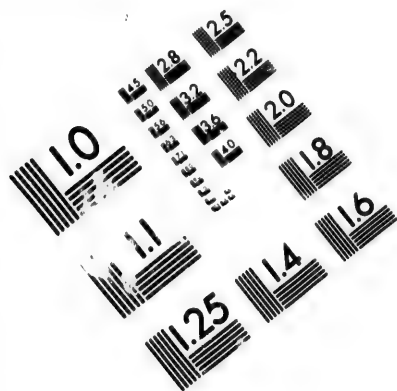
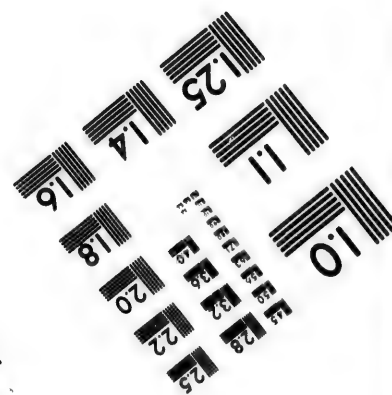
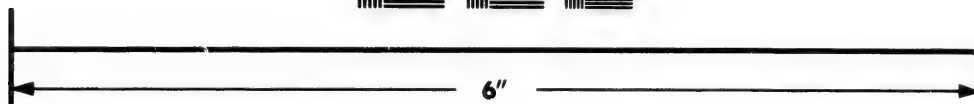
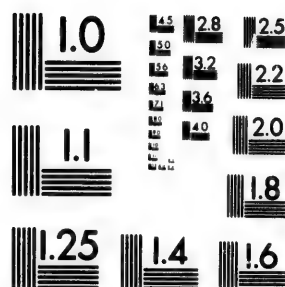


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WALKER ISLANDS.—A wide extent of ocean intervenes in this belt of latitude between the positions of the foregoing islands and that of the isolated cluster which are named as above. From a notice preserved by Mr. Purdy, they were discovered by Captain Walker, in 1814, and consist of a group of small, low, and well-wooded islands. Their lat. is $3^{\circ} 34' N.$, long. $149^{\circ} 15' W.$ On some charts they are marked as *Low Woody Islands*.

JARVIS ISLAND.—Although this island is to the South of the equator, it is so connected with the groups which are next described, that we give it a place here. It was discovered by Captain Brown, of the English ship *Eliza Francis*, August 21st, 1821. At it was surveyed by the *Peacock* and *Flying-fish* of Comm. Wilkes, U.S. Exploring Expedition, December, 1840, the position then ascertained must be preferred to others, lat. $0^{\circ} 22' 33'' S.$, long. $159^{\circ} 54' 11'' W.$ Wilkes describes it as a small coral island, triangular in shape, $1\frac{3}{4}$ mile East and West, and a mile North and South. No reef surrounds it, and it may therefore be safely approached, but it was considered very dangerous.

It is one of the islands worked by the American Guano Company, and the description given by Mr. J. D. Hague shows that it is a *raised* coral island, the interior lagoon having disappeared, and its bed being now 7 or 8 feet above the sea, with many marks indicating the gradual retreat of the sea. The guano found on it differs from that of other islands from this cause; much of it contains sulphate of lime (gypsum), which is supposed to arise from the action of the evaporating salt water on the coral rock. There is but very little vegetation on it. The vessels which come here for the guano moor to mooring-buoys in very deep water, in the same manner as at Baker Island.

It is certainly the same as *Bunker Island*, and perhaps as no mention is otherwise made of it, as *Brooke Island*, placed in $1^{\circ} 13' S.$, long. $159^{\circ} 40' W.$ The other authorities generally place Jarvis Island somewhat to the West of Captain Wilkes's longitude.

CHRISTMAS ISLAND, a coral lagoon island, was discovered by Captain Cook, in the *Resolution* and *Discovery*, on Wednesday, December 24th, 1777. He remained there till January 2nd ensuing, and observed an eclipse of the sun, and from the season gave it the name. It is, like all other islands of the same nature, a belt of low land, enclosing a lagoon, which, however, in this case is very shallow. It is so low that the land cannot be seen more than 8 or 10 miles off. The entrance into the lagoon is on the N.W. side, and was divided into two channels, fit only for boats, by a small island, on

He says the island is small and rocky, in lat. $6^{\circ} N.$, long. $106^{\circ} W.$ Admiral Krusenstern says it is probably the same island as L'île de la Passion, in $16^{\circ} 54' N.$, $106^{\circ} W.$

which Cook landed his instruments, and planted some cocoa-nuts, yams, and melon seeds. Here he also left a memorial of his visit.

The low land is covered with stunted bushes, and a few cocoa-nut and palm trees here and there. From the S.E. to the N.W. points of the island Cook says the coast runs N.W. by W. $\frac{1}{4}$ W. $25\frac{1}{2}$ miles, but Captain Hooper found that the land had much extended, and that the island was much larger than previously represented. A deep bay, however, runs to the northward from a point of land about $13\frac{1}{2}$ miles from the S.E. point, near which are two conspicuous cocoa-nut trees, bearing about N.E. by E., *true*, when in one with the point. Close to the S.W. point are two or three groves of cocoa-nut trees (which from the sea appear as one), planted by Capt. Cook on its discovery. From the S.W. point the land trends N.E., *true*, $4\frac{1}{2}$ miles, forming a small bay, in the N.E. part of which is anchorage, half or three-quarters of a mile from the shore, sand and coral, 9, 8, 7, and 6 fathoms. No turtle were seen by Capt. Scott, September, 1840, although Cook found an abundance. From the N.E. point of this bay the land appears to run away East into a narrow bight, and then trends to the W.N.W. in a slip, terminating in the N.W. point, which bears nearly North 7 miles from the S.W. point.

The island does not afford any fresh water. Cook's party dug without success in several parts of it, consequently it is uninhabited, except by flocks of sea-birds, who here lay their eggs under the low trees in parts of the island. They also caught abundance of fish. Though a vessel on its shore may be seen from most parts of it, it was still large enough for some of Cook's sailors to lose themselves on it, and to be recovered only after great privations.

In November, 1857, a lumber barque *J. C. Fremont* was wrecked in the large bay on the East side of the island, and Captain Hooper went to seek it in the brig *John Dunlap* and schooner *Dolphin*, in 1858. He says:—

"On the S.W. point of the island is a grove of cocoa-nut trees, numbering perhaps six hundred; on the North side of the bay and lagoon are two or three clusters, and one towards the S.E. point. The most distant clusters cannot be seen the one from the other, as they are 25 miles apart, and the island is much larger than it is generally supposed to be. In the large S.E. bay, where so many wrecks occur, there is no anchorage; the water is very deep close to the shore, with a strong tide and surf setting on it. The land is not over 10 ft. above the sea level in any part, and cannot be seen from a ship's deck more than 8 to 10 miles off. Navigators should, therefore, be cautious in approaching it.

"A singular circumstance noticed was that the fish, in the large lagoon near which the camps were erected, were all dead, and in passing over the water in a boat they could be seen at the bottom; also on the lee shore of this lake the fish were piled up in a state of preservation; on being broken

in two they were as sweet and wholesome as possible. The water of this lake is extremely salt, and stronger than any pickle ever used in curing fish or meat."

Captain Scott, R.N., H.M.S. *Samarang*, 1840, confirms Cook's position of the island. Cook places the small islet in lat. $1^{\circ} 59' N.$, long. $157^{\circ} 30' W.$

According to Captain Scott, its S.E. point is in lat. $1^{\circ} 40' 34'' N.$, long. $157^{\circ} 13' 53''$; S.W. point, lat. $1^{\circ} 51' 54'' N.$, long. $157^{\circ} 38' 57'' W.$; N.W. point, lat. $1^{\circ} 59' 30''$, long. $157^{\circ} 30' 3'' W.$; S.E. point, meridian distance from Resolution Bay, Marquesas, $18^{\circ} 2' 28'' W.*$

FANNING ISLAND was discovered by Captain Edmund Fanning, in the American ship *Betsy*, in 1798. The next recorded account of it was by Capt. Legoarrant de Tromelin, who came here in the French corvette *La Bayonnaise*, in 1828. But his description does not at all accord with that of the discoverer; perhaps the coral island had increased in the interval. Prior to 1855 an Englishman, Captain Henry English, had established himself here with a few natives of Humphries Island and other places, to trade in the production of cocoa-nut oil. They placed themselves under British protection, when Captain W. H. Morshead, R.N., came here in H.M.S. *Dido*, on October 16, 1855. It was visited by Captain Pearse in H.M.S. *Alert*, in 1861, and was accurately surveyed by Captain G. H. Richards, R.N., the present hydrographer, in H.M.S. *Hecate*, in 1863.†

The island belongs to Captain Henry English, as above mentioned, and he, with his few white companions and about 150 natives, have much extended the cultivation of the cocoa-nut palm.

Fanning Island is of coral formation, of the lagoon type, and in shape a rude oval, $9\frac{1}{2}$ miles long N.W. and S.E. Towards the centre it is about $3\frac{1}{2}$ miles wide, but towards its south-eastern end $5\frac{1}{2}$ miles; and its circumference is 27 miles. It is skirted by a small reef extending all round the island, but only to the distance of half a cable from the beach, and against this the ocean swell breaks, but seldom with any violence. Outside the reef there is no danger of any kind. The belt of land which forms the island has

* *Sarah Anna Island*, announced in the New York Tribune, March, 1858, as lying in lat. $4^{\circ} 0' N.$, long. $154^{\circ} 22' W.$, is *doubtful*, as Vancouver passed near the position. It may be the same as Malden Island on the same meridian, but in $4^{\circ} 0' South$.

† It is not improbable but that this may be the *American Isles*, stated by Kotzebue to have been discovered by Captain Mather, of the *American*, in 1814, $28'$ more to the West, and also the *Weeks Island* of whaler report, lat. $3^{\circ} 47' N.$, long. $158^{\circ} 37' W.$ It is singular that Captain Hudson, of the U.S. Exploring vessel *Peacock*, should be satisfied that there is no other island than Washington Island hereabouts. He states that he diligently sought for eight days the positions where five islands have been reported to exist, but no land was seen. Perhaps the strong and various currents hereabouts may have led to some confusion.

an average breadth of half a mile, and only at one spot, near its North end, does it exceed three-quarters of a mile; it is densely covered with cocoa-nut trees, which produce fruit of the very finest description, but the regularity of the forest is occasionally broken by gaps, leaving thick clusters of trees standing apart, with a low coral space between. One very conspicuous gap is near the N.E. point of the island, and the continuity of the belt of land is greatly broken there.

ENGLISH HARBOUR.—The lagoon is spacious, but generally shallow and full of coral heads. The entrance is near the centre of the S.W. side of the island, where the channel is about $1\frac{1}{2}$ cable wide, but not navigable for large vessels over half that width. Just outside the entrance, $2\frac{1}{2}$ cables W. by S. from the flag-staff, the depths vary from 24 to 40 feet, decreasing to 15 feet and less towards the coral reef. The northern side of entrance is the shoalest, and the depth at three-quarters of a cable from the northern shore does not exceed 15 feet, but at one-third to half a cable distance from the southern shore the depth is 30 and 32 feet. Inside is a tolerably extensive basin which affords safe anchorage, in 28 and 30 feet water, bottom of coral and sand, with the flag-staff on the South side of entrance bearing S.W. $\frac{1}{2}$ S., distant $1\frac{1}{2}$ cable. This is English Harbour, which Captain Morshead said would be an invaluable spot for a rendezvous. The holding-ground is good, and there is sufficient room for several vessels when properly moored to lie in perfect safety. Further in the soundings decrease to 16 and 12 feet, and there are besides several shoal spots; beyond these there is again deep water, but to what distance the chart does not show.

It is high water, at full and change, at 6^h; springs rise 3 feet. The stream in the harbour turns at high and low water, and runs from 4 to 5 knots.

Vessels should not attempt to enter this harbour except at slack water.

WHALEMAN ANCHORAGE.—There is excellent anchorage for ships on the West side of the island, towards the N.W. end, and $2\frac{1}{2}$ miles north-westward of the entrance to English Harbour; it is called Whaleman anchorage or bay, but has no title to the latter denomination. The depth of water is said to range from 8 to about 15 fathoms at half a mile from the beach. Here ships of the largest class have at times anchored to procure a supply of fresh water, which is abundant adjacent to the anchorage.

The trade-winds blow steadily from the eastward almost all the year round, and the island is seldom or never the scene of any boisterous weather. The months of March and April are generally the worst.

The flag-staff, on the South side of entrance to English Harbour, is in lat. $3^{\circ} 51' 26''$ N., long. $159^{\circ} 22'$ W.; Point Alert (the East extreme of the island, near which there is a gap in the continuity of the cocoa-nut forest), lat. $3^{\circ} 52'$ N., long. $159^{\circ} 15'$ W.; the North extremity of the island in lat. $3^{\circ} 56\frac{1}{2}'$ N., and nearly on the meridian of the flag-staff in English Harbour; the South extremity in lat. $3^{\circ} 48\frac{1}{2}'$ N.

The island is very fertile and produces bananas, pumpkins, *taro*, figs, melons, cabbages, radishes, tomatoes, and numerous other garden vegetables, introduced by the settlers. Every facility is offered for procuring fire-wood and water, as well as any fruit and vegetables in season, and the visits of whalers for this purpose are not infrequent. Fish is abundant in the lagoon.

Bound from Honolulu and the northward make the island on the East side, and sail round the South side. Ships must be careful on entering the harbour, as the coral reefs project further seaward there than elsewhere; but probably a pilot can be procured.

WASHINGTON ISLAND was discovered by Captain Fanning, the day after he had discovered the island bearing his name to the S.E. It has also been called *New York Island* on the charts, and is probably the *Prospect Island* announced in 1858. According to Captain Wilkes, it is in lat. $4^{\circ} 41' 35''$ N., long. $160^{\circ} 15' 37''$ W., very nearly the position originally assigned. It is $3\frac{1}{2}$ miles long by $1\frac{1}{4}$ mile broad, and is entirely covered with cocoa-nut and other trees, exhibiting a most luxuriant growth. There is a reef off its eastern point, which extends for half a mile. At the western end a coral ledge extends 2 miles in a N.W. by W. direction, on which the water appears much discoloured, but the sea was not seen to break upon it, except close to the point of the island. It is elevated about 10 feet above the sea. The surf is very heavy, and the island affords no anchorage.

PALMYRA ISLAND was discovered, November 7, 1802, by an American vessel of the name, during her passage from Juan Fernandez to Manila. According to the description of her commander, Captain Sawle, it was uninhabited, flat, and has a lagoon in its centre 7 miles long, in which the tide regularly ebbs and flows. The island is 14 miles in extent from East to West, and about half that in breadth. The *Palmyra* anchored on the N.W. side of the island in 20 fathoms, at three-quarters of a mile off shore. Abundance of turtle were found, but no fresh water.

It was taken possession of by Captain Zenas Bent, of Honolulu, for the Hawaiian Government, in 1262, having been previously claimed for the American Guano Company. Captain Bent's description makes it only 10 miles long by 6 miles broad. The eastern end rises about 20 feet; the landing place is on the West end, and a vessel can be in perfect safety in a depth of 3 fathoms. Some people were left on it to cure biche-de-mer. He places it in lat. $5^{\circ} 50'$ N., long. $161^{\circ} 53'$, but Captain Sawle places it 30 miles to the westward.

The tide ebbs and flows about 5 feet, and runs in and out of the lagoon at a rate of 6 or 7 knots.

The **SAMARANG ISLES** were discovered by Captain Scott, in H.M.S. *Samarang*, September 15th, 1840. They may be the same as Prospect island. They are a group of about 14 or 16, forming a belt round an apparently shallow lagoon, and are covered with flourishing cocoa-nut and palm trees to the water's edge. In the centre of the eastern reef is a small dry sand-bank; the reef itself extends from the eastern islet nearly East, about two miles, over which the sea breaks heavily. Another reef runs out from the western islet, about a mile to the westward; what distance they run in that direction was not ascertained; but at 3 miles from the breakers on the western reef soundings were obtained in 9, 8, and 7 fathoms, at which time the N.W. breakers were discovered from the foreyard. By the angles that were taken they stretch out full 9 or 10 miles to the N.W. from the western islet; the northern edge of the N.W. reef appeared from the mast-head to run away about S.E. by E. till it joined the eastern one. Broken water was observed here and there along the whole line, with evident shoal water between it and the coral reef before mentioned.

With the strong currents experienced by the *Samarang* in this neighbourhood, a more dangerous spot to those navigating these seas, unacquainted with its existence, can scarcely exist than this group of coralline islets, with their extensive reefs. Had it not providentially fallen calm during the night, the *Samarang* must inevitably have been lost, with the probability of every soul on board perishing, as her course would have taken directly on to the reef.

The eastern breakers are in lat. 4° 56' 15" N., long. 162° 17' 35" W.; and the West islet is in lat. 4° 55' 9", long. 162° 22' 20" W.*

* DOUBTFUL ISLANDS.—*Madison Island*, from whaler report, lat. 5° 30' N., lon. 169° 0' W., is probably Palmyras Island.

Four Islands, said to be in lat. 4° 32' N., long. 169° 32' W. Captain Stone, of the brig *Josephine*, in quest of guano islands, sought for this group, but was assured that no islands or dangers existed within 250 miles of the place.

Perhaps this last assertion may include *Davis Island*, said to have been found in 1858, in lat. 6° 40' N., long. 170° 10' W.

An island or shoal, in lat. 6° 36' to 6° 39' N., long. 166° 0' to 166° 18' W., has been three times announced by whalers. Captain Stone, in the *Josephine*, ran near the first position at mid-day; good observations; and although she saw many birds, among them land birds, yet no land was seen.

To these may be added an island in 8° 40' N. and 168° 0' W. from whaler report, which is probably *Barber Island*, if that exists.

Barber Island is also placed in lat. 5° 0' N., long. 177° 54' W.

Another island, which may be *Barbary Island*, is said from whaler report to be in lat. 8° 0' N., long. 177° 20' W.

Barbara Island, from a report in the New York Tribune, March, 1858, exists in lat. 3° 54'

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Kingman or Alice Thorndike Reef, Captain Kingman, of the American ship *Shooting Star*, saw this shoal lying to the northward of Palmyra Island. It is composed of coral and sand, and when the breakers on the N.E. part bear East, with a moderate breeze, a few small spots of coral can be seen above water. The northern part runs E.S.E. and W.N.W. 12 miles. Shoal water extends several miles to the southward. The position ascertained was 6° 27' N., long. 162° 12' W.

The ship *Alice Thorndike* also saw it in 1859, placing it in lat. 6° 24' N., long. 162° 22'. Another authority places it in lat. 6° 30' N., long. 162° 30'. The probable position is therefore 6° 27½' N., and 162° 21' W.*

Diana Shoal, discovered by Captain Henry English, of Fanning Island, lat. 8° 40' N., long. 157° 20' W. It has only 6 feet water over it. The position, it is said, may be relied on, but the *Herald* passed over the site without seeing anything.

CRANE SHOAL was announced in 1863 by Captain Crane, of the schooner *Maria*. She ran over a reef, the rocks of which she saw with about 4 fathoms over them; lat. 5° 53' N., long. 164° 0' W.

BARBER ISLAND, in lat. 8° 4' N., long. 170° 0' W., is a doubtful announcement in the China Mail, but there is nothing to disprove its existence.

BARBARY ISLAND is another doubtful but not disproved report, lat. 9° 0' N., long. 178° 0' W. But in the note on page 702 several other positions are quoted, which must be included among the very doubtful reports.

BAKER ISLAND is a low coral island of similar character to those around it, but it had a large deposit of guano on it, which has been worked by the American Guano Company, and, therefore, is better known. many.

It was seen by Capt. H. Foster, of the barque *Jamaica*, and has been many times vaguely reported, as *Phæbe Island* (see hereafter), or *New Nantucket Island*. Seven positions have been assigned, varying slightly from that given by Capt. J. D. Hague, 0° 13' N., long. 176° 22' W. He describes it as being about 1 mile long and two-thirds of a mile wide, trending East and West. The surface is nearly level, the highest point of which is 22 feet above the level of the sea, showing some evidences of elevation.

N., long. 173° 0' W., and it has also been placed 90 miles West of this position. (This seems to be a peculiarly vague designation.)

Four Rocks, from whaler report, in lat. 7° 51' N., long. 176° 6'. Another *rock*, in lat. 7° 48' N., long. 173° 12' W.

* From whaler reports in the China Mail, a *shoal* lies in lat. 6° 36' N. and 160° 0' W.; another report says lat. 6° 30' N., long. 163° 30' W. These probably refer to the Kingman Reef.

Above the crown of the beach there is a sandy ridge which encircles the guano deposit. This marginal ridge is about 100 feet wide on the lee side of the island, and is there composed of fine sand and small fragments of corals and shells mixed with considerable guano. On the eastern or windward side it is much wider, and formed of coarser fragments of corals and shells which, in their arrangement, present the appearance of successive beach formations. Encircled by this ridge lies the guano deposit, occupying the centre and the greater part of the island. The surface of this deposit is nearly even, but the hard coral bottom which forms its bed has a gradual slope from the borders towards the centre, or, perhaps more properly, from N.W. to S.E., giving the guano a variable depth from 6 inches at the edges to several feet at the deepest part. None of the grass that grows abundantly on the margin is found on the guano.

On the West side is a small open bay, in which is a boat entrance; immediately opposite to which is the temporary hotel, and close to it (to the northward) is the wharf. In the centre of the island are the patches of guano with tramways to the largest deposits. Outside of the reef the downward trend of the island under water is so abrupt that an anchor will not grapple, but falls away towards the bottom of the deep ocean. For this reason it has been found necessary to anchor large buoys outside the reef, to which the guano ships can moor themselves while receiving their cargoes.

Mr. Charles Reeves, of the guano ship *Loch-na-gar*, gives the following recent account of it.—(*Mercantile Marine Magazine*, Jan. 1869.)

Baker Island is situated in lat. $0^{\circ} 12\frac{1}{2}'$ N., long. $176^{\circ} 22'$ W.; it is of coral formation, rising from the sea abruptly to a height of 15 ft., and of nearly circular form, about 2 miles in circumference.

The wooden houses upon the island, to the number of twelve, can be seen 14 miles from the mast-head; but if a ship should be at the buoy there, she can be seen long before the island. On approaching the island, care should be taken not to be set to leeward by the current, which constantly sets W.S.W., 2 knots an hour. If a ship once gets to leeward, she may be weeks before she is able to beat up to the island again.

As soon as the island is visible, the jack should be hoisted at the fore-royal mast-head, and as a matter of precaution the royal taken in, to make certain of the jack being seen. As soon as she is made out as bound to the island, the American ensign will be hoisted from the signal-staff, if it is favourable for coming to the buoy. But should the ensign not be hoisted by the time the ship is close to the island, it is a sign that there is too much danger to come to the buoy. Therefore be prepared to haul to the wind when they hoist up "Stand to Sea," and carry all possible sail to hold your own against the current.

But when the ensign is hoisted, get up your best lines to run to the buoy; they sometimes have lines at the island, but just as frequently as not

they have been carried away, and they have to depend upon yours. Steer for whichever end of the island will give you the weather gage, for you will have to luff round the lee side of the island to the buoy. The mooring master comes on board about 2 miles from the island and takes charge.

The easterly winds are frequently interrupted by squalls from the westward, more especially from November to March.

As soon as dark clouds are observed gathering up to the westward, do not hesitate a moment, but slip at once before the easterly wind fails. If you are tempted to hang on, and the easterly wind fails, the ship swings round, and no power can save her from destruction. The wreck-strewn island bears melancholy evidence of this; the beach being covered with spars that floated ashore, the only remains of the numerous ships which have been lost here; the hulls slide down the reef into deep water.

It frequently happens during the winter months that heavy surfs set in all round the island. It would then be advisable for the ship to go to sea if there is any wind to slip, for there is no communication with the island except by signal, and there is great risk of the ship being lost.

HOWLAND or Holland Island was discovered by Capt. G. E. Netcher, in the *Isabella*, of Fairhaven, U.S., September 9th, 1842. It was afterwards several times reported by whalers in 1851 and 1858, and in the latter year by Captain Paty, of the schooner *Liholiho*. On January 16th, 1859, Capt. Eldridge, of the American barque *Amazon*, announced it as a new discovery. Since that period it has been occupied by the American Guano Company. It will be needless to quote the nine positions assigned to it, but it is very nearly in lat. $0^{\circ} 50' N.$, long. $176^{\circ} 35' W.$ *

Captain J. D. Hague, who came here in 1860, in search of guano, says: It is about $1\frac{1}{2}$ miles long by half a mile wide, containing, above the crown of the beach, an area of some 400 acres. The highest point is 17 feet above the reef, and 10 or 12 feet above the level of the high tide. It trends N.N.W. and S.S.E.

The general features of the island resemble those of Baker. Its surface, at least on the western side, is somewhat depressed, and much of it is covered by a growth of purslain, grass, and other vegetation, like that on Baker Island, but considerably more abundant. Near the centre of the island there are one or two thickets of leafless trees or brushwood, standing 8 or 10 feet high, and occupying an area of several acres. The tops of these trees in which the birds roost, are apparently quite dead; but the lower parts,

* *Faguin Islands*, reported by a whaler as in lat. $46^{\circ} 0' N.$, long. $171^{\circ} 59' W.$, and another island by the same authority, 35 miles to the southward, must refer to Howland and Baker Islands.

near the roots, show signs of life after every rain. The windward side of the island is formed by a succession of ridges composed of coral debris with some sand and shells, running parallel to the eastern beach, each one of which may, at earlier stages of the island's growth, have successively formed the weather shore. Occasionally among these ridges a sandy bed is met with in which some little guano is mixed. On the lee side there is also a sandy margin of considerable width. Bits of pumice and pieces of driftwood are scattered all over the island's surface.

The main deposit of guano occupies the middle part of the island, and stretches, with some interruptions of intervening sand, nearly from the North to the South end. Its surface is even, and in many places covered by a thick growth of purslain, whose thread-like roots abound in the guano where it grows. The deposit rests on a hard coral bottom, and varies in depth from 6 inches to 4 feet. The fact, as observed at Baker Island, that vegetation flourishes most where the guano is shallow, is also quite apparent here, and the consequent characteristic difference between the guano of the deep and shallow parts is distinctly marked.*

GILBERT ARCHIPELAGO.

In this group there is considerable confusion of names. This arises from the fact of their disjointed discovery, the name applied to one portion of an island not being extended to the whole. In the subsequent descriptions we have endeavoured to reconcile these discrepancies, which will best explain themselves.

The first island discovered was the easternmost, Byron Island, so named

* DOUBTFUL ISLANDS.—The following announcements of discoveries hereabout, either require confirmation or do not exist:—

New Market Island, according to Mr. Consul Pritchard of Apia, lies in $0^{\circ} 22' N.$, long. $174^{\circ} 40' W.$ This must refer to Baker Island.

A *reef*, by the same authority, lies in lat. $0^{\circ} 21' N.$, long. $173^{\circ} 20' W.$ A *doubtful* reef is placed 40 miles to the North of it on the charts. These must also refer to Baker and Howland Islands.

Starbuck Island, in lat. $0^{\circ} 0'$, long. $178^{\circ} 30'$, is perhaps intended for $173^{\circ} 30' W.$, and refers to Henderson Island.

Phæbe Island, lat. $0^{\circ} 20' N.$, long. $176^{\circ} 40' W.$, cannot be found. Commander Sinclair, of the U.S. ship *Vandalia*, could not find it; and Mr. Foster, mate of the *Jamaica* (China mail), who passed its reported position above twenty times between 1842 and 1844, never could see it. It is therefore probable that it is a transposition of Baker Island from West into East longitude.

Mitchell Island, from whaler report in lat. $9^{\circ} 18' N.$, long. $175^{\circ} 30' E.$, is believed not to exist.

An *island*, in $10^{\circ} 0' N.$, long. $180^{\circ} 0'$, and *reefs* in the same latitude, but in $173^{\circ} 30' E.$ and $179^{\circ} 15' E.$, from whaler report, if they exist, probably refer to the same.

from the commander, who saw it June 3rd, 1765. The next were the northern groups, discovered by the ships *Scarborough* and *Charlotte*, commanded by Captains Marshall and Gilbert. There is a loose account of this discovery given in Governor Phillip's voyage, in 1788. The next authority in order is a chart contained in Dalrymple's collection, drawn by Roger Simpson and George Bass, officers of the *Nautilus*, under Captain Bishop. In the Table of Positions, by John Purdy, is an account of some of the islands seen by the brig *Elizabeth*, about 1809. In 1824 Captain Duperrey visited and explored many of them; but by far the most complete account of them is given in the account of the United States' Exploring Expedition. The ship *Peacock*, and her tender *Flying Fish*, surveyed the greater part of them.

The name *Gilbert Archipelago* was given to the group by Admiral Krusenstern, after the commander of the *Charlotte*, one of the first explorers; the other commander's name being given to the group to the northward. Krusenstern separates them into three groups, the *Kingsmill Islands*, consisting of Bishop or Drummond Island and their subordinates; the *Simpson Group*, Woodlee, Henderville, and Hopper, from the before-mentioned officers of the *Nautilus*; and the *Scarborough Range*, Marshall, Knoy, Matthew Islands, &c., from Captain Gibbon's vessel. All these names seem to be very appropriate, and have been for many years acknowledged; we therefore follow them. On the other hand, in the American work they are all given under the collective title of the *Kingsmill Islands*; the name being only that of a small portion. From the account of the expedition we derive much of the following.

According to the information collected by Captain Hudson and Mr. Hale, and furnished to Commodore Wilkes, the group consists of fifteen (or more properly sixteen) islands, ten of which were visited, the rest assumed from native information. The highest land of the group is not more than 20 feet above the sea, and they are all of coral formation, having a general resemblance to the usual form of those islands. But it was found that, unlike those, many of the islands of this group afforded anchorage on their lee side on sand banks; and in some of them the lee or western reef is wanting; this would form a distinctive character, and affords additional weight to the fact that the islands are fast wearing away by the action of the sea on them during westerly gales. The compact coral shelf is found at the depth of 12 ft. beneath the surface. Another evidence of their decrease is, that in all cases where the island is at all exposed, it has become, as would be in such a case, a string of detached islets.

Their soil, which is but a few inches in depth, is of coral sand and vegetable mould, below which coral sand is to be found, and to this depth the wells and taro patches extend. The rain water percolates thus far, and meets the coral rock. Pieces of pumice are found, supposed to have been drifted on to it. The cultivation is chiefly cocoa-nut and pandanus, the

chief articles of food. A species of taro (*Arum cordifolium*) is also grown with great care. On Makin or Pitt Island it is said that there is a trench, 10 feet wide and not less than 7 miles long, dug around the lagoon, for the cultivation of this taro.

The Rev. L. H. Gulick, M.D., has given an excellent account of this and the neighbouring groups of Micronesia, which embraces the four archipelagoes of the Gilbert, Marshall, Caroline, and Ladrone Islands, and of their people. We derive many of the ensuing remarks from his lectures.

Since the visit of the United States' Exploring Expedition those islands have grown into some importance to the civilized world from their production of cocoa-nut oil. Very many sailors have at different times resided on shore—not an island of the group but has been thus thoroughly explored—and there are several who seem to have made their home there, particularly one respectable trader, of rapidly increasing wealth, named Randall.

In November, 1857, a mission station was taken on Apaiang, or Charlotte Island, by the Rev. H. Bingham, Jr., and a Hawaiian associate. In Sept. 1860, a second station was taken by two Hawaiians on the neighbouring island of Tarawa. The language has been reduced to writing, and a number of children are fluent readers.

Nothing is more remarkable at the Gilbert Islands to one who has visited other parts of Micronesia, than the great number of the people. Elsewhere the sparseness of the population is painful; but here the overflowing swarms are continually surprising one. The smallest of the atolls, Peru, whose diameter is not more than about 2 miles, has a population of from 1,500 to 2,000, and Aranuka has 1,000, while Tapiteuwea has from 7,000 to 8,000. In almost every other part of Micronesia the houses are scattered, and if there are what may be termed villages, they are but small collections of houses, and in no very close proximity to each other; while here the habit is to congregate in towns, where the houses are in nearly as close relation to each other as possible. These villages are—as is almost invariably the case on the low, annular islands—on the inner or lagoon shore, and as one lays at anchor within the collections of low, white-roofed houses stretching along under the cocoa-nut groves, may be seen every few miles, the canoe sheds first, in a row along the beach, and then the dwellings, which are nothing more than roofs, standing promiscuously just behind, usually with a large council-house in the midst.

Captain Randall estimated the population of the group at from 50,000 to 54,000, so that it contains more than half of the population of Micronesia respectively, there being 20,000 to 25,000 on the Ladrone and Caroline Islands, and perhaps 10,000 on the Marshall Islands. As the area of the dry land is not more than 150 square miles, there will be from 300 to 350 persons per square mile, a density scarcely equalled in the world.

In physical appearance this people are darker and coarser as a whole than

the more western inhabitants of Micronesia. They are also a larger race, some of the chiefish ones being very corpulent, equalling in size the ancient chiefs of Hawaii. This is also the more remarkable from these islands being the most barren of the atolls of Micronesia. The cocoa-nut and the pandanus, and a few laboriously cultivated taro, are the only vegetable productions, while the greater number of the low islands of the Marshall and Caroline Archipelagoes produce taro, bread-fruit, and jack-fruit in considerable abundance.

The usual height is about 5 feet 8 or 9 inches, but we saw many who were considerably below this standard. There are none of those burly persons among them which are so common in the Sandwich and Society Islands, and we did not see one instance of obesity.—*Mr. Hale.*

The food of these people, besides the plants mentioned, consists of all kinds of fish, from the whale to the sea-slug. Great numbers of fish are taken in weirs on the coral flats. Turtle are taken in the season on the beaches; and shell-fish, with the sea-slug or biche-de-mar, are obtained by diving. Whales are said to have been formerly much more numerous than now. They then sometimes got aground and were taken. Now a carcass occasionally drifts on shore.

There is not much to induce general trading vessels to come here; they possess but little in the way of refreshment, and there is neither wood nor water in any quantity. They possess many good harbours, a rare advantage in low coral islands.

The Climate of these islands is equable, and though of high temperature, it is found to be less oppressive than in most tropical countries. For the most part constant breezes prevail, and frequent rain falls, which moderates the great heat, and at the same time confers fertility on the soil. From October to April, the time of the *Peacock's* visit, is the winter, and is especially distinguished by the frequency of rains. Variable winds from the northward and westward prevail at this season, and they have violent gales from the S.W.; these, according to Kirby (who was taken off the islands), are typhoon like. The natives plant stakes to prop up their houses, and tie them down, to prevent them from being blown away. These storms last three or four days, veering gradually round to the North. The leeward sides of the islands receive most damage, and both land and trees are swept away. Kirby stated that, during his residence, the lee side of Kuria had worn away. In these gales, the trunks of large trees are thrown on the West side of the island, together with large lumps of resin, similar to that found on the soil at New Zealand, which the natives use to scent their oils with. These trees, sometimes 2 feet in diameter, were thought to be of the pine species. Many stones are found in their roots, from 8 to 10 inches in diameter. These are a fine basalt, and the natives use them for various purposes.

From May till September the weather is fine, with clear skies, and only occasional showers; and during this time the wind blows constantly from the eastward. This is the season in which the natives make their voyages; they never venture abroad in the winter months, even from island to island, being well aware of the danger of so doing.

Earthquakes are occasionally experienced in these islands. Kirby stated that during the three years he was on Kuria, or Woodle Island, he had felt ten or twelve, sufficiently sever to shake down a house. The natives exhibit no fear on account of them. The direction of the oscillations seems to be from the S.W.

The following account begins with the southernmost of the archipelago, and proceeds northward.

ARURAI, *Arore*, or *Hurd's Island*, is the southernmost of the group. It was discovered in the *Elizabeth*, prior to 1810, and was then named *Hope Island*. "But," says Mr. Purdy, "there being another Hope Island at about 14° distant to the northward of the equator, I have substituted Hurd Island on the chart, from respect to Captain Hurd, of the navy, hydrographer to the Admiralty."

The following account of it is given by M. Dutailis:—It is low and well wooded. It perhaps may be seen at 10 miles off. Its length is 6 or 7 miles, and its breadth 1 or 1½ miles. It cannot be reached except on the West. The South point is terminated by a breaker which extends to 3 cables length.

The sea breaks heavily on the shore to the East. At the North point of the island there is a bank of sand, with some rocks interspersed, on which there are but 3½ fathoms. It is all the more dangerous because the sea does not always break on it. Its extent is about 4 miles, and its direction is determined by the angles comprised between N.N.E. and E.N.E., of which the North point is the summit. The West point of this island forms an extensive bay, where the whalers anchor. Fish, poultry, cocoa-nuts, &c., are easily procured in exchange for tobacco.

The island has 2,000 to 2,500 inhabitants. They are completely naked. Their canoes, formed from a vast number of pieces, are clinker built, and are most graceful in form.

South point, lat. 2° 40' 54" S., long. 177° 1' 13"; North point, lat. 2° 37' 21" S., long. 176° 56' 57" E. These results are nearly identical with those assumed by Mr. Purdy.

NUKUNAU, or *Byron Island*, was discovered by Commodore Byron, July 2, 1765. He describes it as a low, flat island, of a most delightful appearance, and full of wood, among which the cocoa-nut was very conspicuous. He saw, however, to his great regret, much foul ground about it, upon which the sea broke with a dreadful surf. He sailed along the S.W. side of it, and

estimated it to be 4 leagues in length. It was very populous, but they could find no landing place. The position is given as lat. $1^{\circ} 25'$, long. $176^{\circ} 40'$ E.

PERU, or *Francis Island*, is also called *Peroat*, *Maria*, and *Eliza Island*, on former charts. It was discovered by Captain Clerk, of the ship *John Palmer*, in 1827. Its population, according to Captain Randall, is 1,500. The South point is in lat. $1^{\circ} 20'$ S., long (about) $176^{\circ} 11'$ E.

ONOATOA, *Onutu*, or *Clerk Island*, may be the *Rotcher Island* of former charts. It is in lat. $1^{\circ} 50'$ S., long. $175^{\circ} 39'$ E. The population is about 4,000.

TAMANA (or *Rotcher Island*, according to Dr. Gulick) is in lat. $2^{\circ} 35'$ S., long. $176^{\circ} 7'$ E. The population is about 3,000.

TAPUTEQUEA or *Bishop* or *Drummond Island*.—This extensive island, or group of islets, had the second of the foregoing names applied to it by Adm. Krusenstern, from the commander of the vessel, the *Nautilus*, who is presumed to have discovered it. In the chart drawn up from that voyage, the only island named is *Drummond Island*; it is there shown as 26 miles, the whole length lined with rocks and reefs, outside of which the *Nautilus* anchored in 18 fathoms. At 5 miles to the West of this reef is another, shown separately on the chart under the name of the *Nautilus Shoal*, near which the vessel passed. Both of these were examined by Captain Duperrey, in 1824. But the fullest account is that given in Capt. Wilkes's Narrative.

It was made by the U.S. Exploring ships *Peacock* and *Flying Fish*, April 3, 1841. They here encountered the regular N.E. trades. It is situated in lat. $1^{\circ} 20'$ S., long. $174^{\circ} 57'$ E. It is of coral formation, 30 miles long in a N.W. and S.E. direction, and varies in width from half to three-quarters of a mile. This, however, only includes the high portions, or that which is above the ocean level a few feet. It is thinly covered with cocoa-nut and pandanus trees, and not a patch of grass is to be seen, or any sort of shrubbery or undergrowth. To the leeward, or on its West side, the reefs and sand-banks extend off some distance, gradually increasing from the N.W. point to the S.E., where they are as much as $6\frac{1}{2}$ miles in width. This reef is interrupted in many places, and there is good anchorage off the town of *Utiroa*, towards the N.E. end, near a small sand-band, which is usually bare. The whole shore of the island, as the *Peacock* approached it, appeared covered with houses, presenting to the view one continuous village. At intervals of a mile there were buildings of huge proportions, far exceeding in size any they had before met with.

The natives of this island are totally different to those on the islands to the South. They are middle sized, slender, and well proportioned; their colour a shade or two darker than that of the Tahitians, and they exhibited a greater variety of face and features, with black glossy hair, finer than in other races. Their features are small, but high and well marked, their cheek-bones pro-

jecting, and are the only natives in the Pacific that have the defect of decayed teeth. Altogether they were thought to resemble the Malays. The majority of them go entirely naked, except a conical covering for the head of plaited and bleached pandanus leaf. They exhibited many bodily traces of their warlike dispositions in their numerous scars and wounds. In order to guard against the destructive effect of their formidable shark's-teeth swords and spears, they have invented an effective kind of armour, a sort of cuirass of plaited cocoa-nut fibres, as solid and compact as a board, and half an inch thick. This rises, like a high-backed chair, 3 or 4 inches above the head. They also draw on more flexible coverings for the legs and arms. Their head dress is still more singular, the skin of a porcupine fish cut open at the mouth to fit the head. They were extravagantly fond of tobacco; their chief desire was to obtain it, and in return they always gave something equivalent. Their canoes were different to the other islanders, averaging 12 or 15 feet long, 2 to 3 feet deep, and from 15 inches to 2 feet wide; they are well modelled, built in frames, and have much sheer; they are formed of cocoa-nut-tree boards, sewn neatly together, and use an outrigger, though much smaller than usual; one of the sides is nearly flat, and in this respect resemble the Ladrone proa figured in Anson's voyages.

In Captain Wilkes's narrative, they were much incommoded by the insolence and rudeness of the people, and one of the men having been decoyed away or murdered, the ship's party made an assault on the town of Utiroa, which was burnt.

Captain Randall estimates the population at from 7,000 to 8,000, which will give this small strip of land as great, if not a greater, number of inhabitants to the square mile, than any portion of the globe that relies upon its own resources for subsistence.

Captain Hudson found a bank, on which he anchored, in 15 fathoms water, at the distance of 4 miles from the island. Opposite to the town of Utiroa is a long flat, over which, at ebb tide, a boat will not float: and as it was at low water when they landed, it became necessary to walk through the shallow to the beach, which was nearly a quarter of a mile distant.

No land-birds were seen but curlews, golden plovers, turnstones, noddies, and white terns; many whales' bones were strewed over the beach. This was the first place where they had observed the shells of the *Tridachna gigas*, the gigantic cockle; they were of enormous size; the natives used them for troughs for many purposes around their houses.

There is neither wood nor water to be obtained at this island, and no inducement to visit it, except to trade for cocoa-nuts.

Good whaling ground exists in the vicinity, and the American whalers are in the habit of cruising in this neighbourhood. Those who visit these people ought to keep a constant guard against treachery, for their numbers

are large, and they are prone to mischief. All intercourse with them should therefore be conducted with great caution, especially in ships weakly manned.

NANOUTI or *Sydenham Island* is one of the early discoveries in the group. In the chart drawn up by Roger Simpson and George Bass, of the ship *Nautilus*, given in Dalrymple's Collection, it is or was composed of *Dog Island* and five smaller islands, separated by a considerable reef. On the original chart above mentioned, the S.W. of these islets is called *Two-tree Island*, and the West point of *Dog Island* is called *Cape Morai*. It was examined by Captain Duperrey in his voyage of discovery in 1824. In the Table of Positions by Mr. Purdy there is an account of the discovery by the brig *Elizabeth* of *Blaney Island*, "long, low, and abundantly supplied with cocoa-nut trees." All these observations, however, give place to those of the United States' Exploring Expedition, in which, however, the error is committed of stating it to be the same as the Bishop's Island "of the charts."

It lies in lat. $0^{\circ} 36' S.$, long. $174^{\circ} 24' E.$ It is of coral formation, and a mere ledge of land like Drummond Island, with a lagoon, reef, and a bank on its lee or S.W. side. By Captain Hudson's survey it is 19 miles long, trending N.W. and S.E., and its width, including lagoon and reef, $8\frac{1}{2}$ miles. On the S.W. and N.W. portions of it there is a coral bank, from 1 to $1\frac{1}{2}$ mile beyond the reef, on which there are 10 fathoms water. At the distance of 4 miles from the N.W. end of the island they found soundings in 265 fathoms.

The island is partially covered with cocoa-nut, pandanus, and other trees; and the islets of which it is formed are nearly continuous, connected by the usual coral reef. They had no communication with the natives of Nanouti. A daily intercourse is kept up between it and the Drummond islanders. It was thought there was no difference in their characters. The distance between them is but 15 miles. The population is estimated at 6,000.*

ARANUKA, *Nanouki*, or *Henderville Island*, was discovered by Captains Marshall and Gilbert, and was also examined by Captain Duperrey, in 1824. It was surveyed by the United States' Expedition.

It is in lat. $0^{\circ} 11' N.$, long. $173^{\circ} 39' 20'' E.$ This island is $6\frac{1}{2}$ miles long,

* From the North point of this island there was a small island in sight, which was at first supposed to be Duperrey's Ile du Nord; but if it be, instead of being located to the northward, as he has placed it, it bears nearly South of the North extreme of Nanouti. They found, on proceeding towards it, that it was a hummock connected by a reef with Nanouti; but no *Sable Island* could be seen. The tender passed round the opposite side of Nanouti, and did not see any island; and the officers of both vessels were fully convinced that no *Sable Island* exists.

East and West, and $5\frac{1}{2}$ miles wide at the East end, diminishing to 2 miles at the West end; it is of coral formation. There are two towns on the West end, and several on the East and S.E. parts, and it is thickly inhabited. The natives who came on board the *Peacock* said that the two ends of the island were at war with each other. They are very much the same in appearance as the natives of Drummond Island; were naked, and spoke the same dialect. This island affords neither wood, water, nor refreshments. From appearances, its inhabitants (about 1,000) must be at times much stinted for food.

KURIA or *Woodle Island* was, with Hopper and Henderville Islands, one of the first discoveries in the group, by Cpts. Marshall and Gilbert. It was surveyed by the United States' Expedition.

Its geographical position is in lat. $0^{\circ} 14' 30''$ N., long. $173^{\circ} 27'$ E.; its greatest length is 5 miles N.W. and S.E., and its greatest width, which is at its S.E. end, is $2\frac{1}{2}$ miles. The remainder is very narrow, and almost divided towards the centre. The N.W. portion has two small lagoons, 200 or 300 yards from the beach; the water in them is not so salt as the ocean. In one of them, the bottom consists of red mud on one side, while it is white clay on the other. They are used as fishponds by the chiefs. There is a reef extending to the N.W. nearly 3 miles.

The island is but partially clothed with trees, consisting of cocoa-nut, pandanus, and a few stunted bread-fruit. It has no outer reef, and may be approached very closely. It affords neither wood, water, nor refreshments. The present population is 1,500, not more than one-third of the estimate of 1841. The *Peacock* took off an Irishman, John Kirby, a deserter from an English whaler, who had not been roasted and eaten on his landing, but had had the chief's daughter given him as his wife. He had thus dwelt as one of them from February 11, 1838, to April 15, 1841. He said that the natives, though not professed cannibals, sometimes eat human flesh; but their food is generally fish.

APAMAMA *Roger Simpson*, or *Hopper Island*, was one of the discoveries of Cpts. Marshall and Gilbert, in the *Scarborough* and *Charlotte*, as related in the voyage of Governor Phillip, 1788. It was not seen by Capt. Duperrey. The latter commander believed it to be identical with the *Dundas Island* of the brig *Elizabeth*, 1809. It must also be considered to be beyond doubt the same as the *Roger Simpson Island*, discovered by Captain Bishop in the *Nautilus*. A survey was made of it in the United States' ship *Peacock*, in 1841. This is what is said of it:—

According to the observations then made by Captain Hudson, it is in lat. $0^{\circ} 27' 21''$ N., long. $173^{\circ} 57' 30''$ E. It has heretofore been represented as two islands on the charts, called on one Simpson, and the other, *Hopper* and *Harbottle*; but there is only one, joined by the same reef.

It is about 5 feet above the surface of the ocean, is 10 miles long N.W.

and S.E., and 5 miles in width North and South. The land is continuous on the North and East sides, excepting two small strips of bare reef. There is anchorage on the West side, in an opening between the reef and the N.W. point of the island, which is about 2 miles wide. The soundings vary from 2 to 5 fathoms; across it, in some places, the bottom is broken coral, in others coral sand. The entrance to the lagoon, although feasible, should not be attempted through this passage; but there is a good passage into it on the S.E. side of the island, which is a mile wide. It has a large population, 5,000, but yields little more than will supply their wants. A small quantity of fresh water may be had by digging on the beaches; wood and refreshments are not procurable for shipping.

MAIANA or *Hall Island*.—The name of Hall has been applied to this island both by Duperrey and by the American Expedition, though there is great reason to believe that it was previously seen by the original discoverers of the group, and then named *Gilbert Island*. The name, Hall Island, was given by the commander of the brig *Elizabeth*, in about 1809. If so, it ought to be called Gilbert Island, and the other name has been dropped by Admiral Krusenstern, who reasoned from the imperfect data then in existence.

Capt. Hudson gives the following account from his survey of it:—

It is of coral formation; the N.E. and S.E. parts are a continuous land, whilst to the S.W. and N.W. it consists of a reef and bank, in some places awash, with a sand-spit in its lagoon. The western sides of the island are, therefore, very dangerous, and should be approached with caution, as the sea seldom breaks on them, and the discoloration of the water is not at all times to be observed. The population is 4,000. It affords neither refreshment, wood, nor water. It is 9 miles in length, according to the survey, in a S.E. and N.W. direction; it is situated in lat. $0^{\circ} 56' 45''$ N., long. $173^{\circ} 4' 15''$ E. On its West side, on some of the banks, there is anchorage in from 10 to 15 fathoms water.

TARAWA or *Knor Island*.*—In this island there is very considerable confusion of names, which, from the imperfect observations recorded, must be left in considerable uncertainty. Knor Island was discovered in the *Scarborough* and *Charlotte*. A portion (probably) was named *Marshall Island*. Captain Duperrey takes no notice of this name, but applies the name of *Gilbert Island* to it. In the periodical publications of 1810 there appeared an account of the situation of the islands seen by the brig *Elizabeth*. It was presumed to be in the year 1809, but our chart says 1804. The extracts have been preserved by Mr. Purdy, in his tables. In that work there is an account of the discovery of an island, which was named *Cook's Isle*, the

* *Knor* Island in the American work, which is a perversion. It is Knor Island in the original.

account of which agrees perfectly with that of the South side of Knoy Island, now under consideration. There is no doubt of their identity. It may be assumed, then, that Knoy, Cook, and Marshall Island are meant for the same.

It was surveyed in 1841 by the United States' Expedition. It is in length 20 miles, trending N.W. and S.E. It is in lat. $1^{\circ} 29' N.$, long. $173^{\circ} 5' E.$, and is of coral formation. The land is continuous and wooded, with the exception of four gaps, where the reef is bare. The South side is 12 miles long, and trends nearly East and West. On this part, near the West end, are three hummocks (which appear like islands in the distance), and several small sand-banks, which are connected by the same reef. The island has its lagoon, but it has the appearance of being an extensive bay, in consequence of the reef on the West side being a sunken one, on which is found 5 fathoms of water.

This island is partially wooded, having several groves of cocoa-nut trees on it, and a dense undergrowth. Several towns were seen on it, and it appeared to be thickly inhabited. It affords no supplies for vessels. The natives (3,500 in number) are entirely the same in appearance, in character, and customs, with the rest; they go naked, and speak the same dialect.

MARAKI or *Matthew Island* was also one of the original discoveries by Captains Marshall and Gilbert, in 1788. It is much smaller than either Charlotte or Knoy Islands, and is situated in lat. $2^{\circ} 0' N.$, long. $173^{\circ} 25' 30'' E.$ It is a lagoon island, without entrances, and of coral formation. It is but 5 miles long, N. by E. and S. by W., and $2\frac{1}{4}$ miles wide at its base, being of a triangular shape.

It appeared to be densely peopled, for many villages were seen, and after dark a large number of fires were burning. Captain Randall estimates the population at 2,000. Their dialect and customs were the same as the rest of the group.

APAIANG, Apia, or Charlotte Island.—The name Charlotte Islands was applied to this collection of islets by Admiral Krusenstern, from the idea that the term, *The Six Islands*, was applied by their discoverer, Captain Marshall, in the *Charlotte*. In the original charts the names of these six islands were given as *Marshall, Allen, Gillespy, Clerk, Smith, and Scarborough*; but they all lie in one reef, so must be taken as one. They were not seen by subsequent navigators, particularly by Duperrey, who would have cleared up the discrepancy. The United States' Expedition surveyed it in 1841, and gives the following account of it:—

Apia or Charlotte Island is in lat. $1^{\circ} 52' N.$, long. $173^{\circ} 2' E.$ It is a lagoon island, consisting of a string of coral islets, situated within a reef, which is 6 or 7 feet above the water. The reef has a bluff front, and is much worn by the sea. There is no coral sand. Its length in a N.E. and S.W. direction is 16 miles, and its average breadth 5 miles. On the East

side of the island the land is covered with cocoa-nut and pandanus groves, with some undergrowth. The N.W. and West side is a continuous reef, 4 or 5 feet above the water's edge, on which are many islets. About the centre of the reef, on the S.W. side, is a ship's channel into the lagoon, which is half a mile wide. Near its entrance is a small islet, which stands alone, and is a good mark for the entrance. There is no island in the lagoon, as shown in the French chart of Duperrey. Population 3,000.

MAKIN or *Pitt Island* and *Butaritari* or *Touching Island*.—Of the discovery of these two islands there appears to be no exact record. They were not seen by Marshall and Gilbert, nor by Duperrey; but they were placed too far to the East on the chart. The name of Touching Island is given to the westernmost island on Arrowsmith's chart. The following is Captain Hudson's (of the United States' Exploring ship *Peacock*) account of them:—

There are two islands known under this name; the largest is called by the natives *Taritari* (*Bataritari*) (*Touching Island*), and the smallest *Makin* (*Pitt Island*). The latitude of the southern port of Taritari is $3^{\circ} 8' N.$, longitude $172^{\circ} 48' E.$ This island is of the figure of a triangle, with its apex to the South, and its sides are above 14 miles in length. The S.E. is a continuous grove of cocoa-nut and pandanus, with some undergrowth. On the two other sides is a reef, which is awash, excepting the N.W. point, in which there is a small inlet. The population is 1,500.

Makin is of much smaller dimensions, being but 6 miles long; it varies in width from half a mile to a mile. Its northern point lies in lat. $3^{\circ} 20' 43''$ North, long. $172^{\circ} 57'$ East. The entrance into the lagoon has $4\frac{1}{2}$ fathoms of water, and is about one-third of a mile in width. This small island is the seat of government, and the natives now unite both names under the one of *Makin*. When the *Peacock* approached, it soon became evident that the island was thickly inhabited; for, on reaching the lee side, above twenty canoes came off, with from five to ten natives in each; but in one of them was a white man, Robert Wood or Grey, who had been left on the island by an English whaler, at his own request, seven years before. Dr. Gulick estimates the population at 500.

Banaba, **Paanopa**, or *Ocean Island*, lat. $0^{\circ} 52'$ South, long. $169^{\circ} 44'$ East (*Dutaillis*), is considered as a part of the Gilbert Islands, but is described in our South Pacific Directory.

Nawodo, **Onavero**, or *Pleasant Island*, is also included in the Gilbert Archipelago, but it is far to leeward. Captain Cheyne places it in lat. $0^{\circ} 25' S.$ long. $167^{\circ} 5' E.$ It is also described in the South Pacific Directory.

MARSHALL ARCHIPELAGO.

This extensive collection of islands lies between lat. $4^{\circ} 45' N.$ to $12^{\circ} 0' N.$ and is separated from the Gilbert Islands by a channel 50 leagues broad. The Rev. Dr. L. H. Gulick has devoted much attention to this group, as well as to the other islands of Micronesia, and his nomenclature will be followed hereafter. The spelling of the native names is that adopted by the Micronesian mission—the system of Lepius. He considers that it is almost certain that Alvaro de Saavedra visited both chains in 1529. More than two centuries elapsed before they were again visited, as far as is known. Captain Wallis visited what is now known as the Rimski-korsakoff Islands in 1767.

But the most important of the early voyagers is that of 1788, by Captains Marshall and Gilbert, of the English navy, in the ships *Sarborough* and *Charlotte*, in their voyage from Port Jackson to China, which voyage originated in the first colonization of Australia. As Captain Marshall was the principal officer of the expedition, his name has been applied to the whole archipelago by Krusenstern and others; that of Captain Gilbert has been given to that to the southward. There is considerable confusion in the original accounts, Captain Gilbert having named some of the islands already named by Capt. Marshall; and Capt. Bishop, who ten years later discovered some of them, has also named them, which has caused great difficulties in the nomenclature, that are not decreased by the great discrepancies between the respective longitudes given by these officers.

Besides the discoveries of Captain Marshall, there is another range of islands, occupying the same extent of latitude, at 3 degrees to the westward of them. These islands have been accidentally discovered by various navigators proceeding to India.

In May, 1816, Kotzebue first saw the closely-connected groups of Taka and Utirik, while on his way to the North. In January succeeding, after recruiting at the Sandwich Islands, he again visited this region, and discovered and thoroughly explored the greater number of the Ratak Islands. In Oct. of the same year he again returned directly from the North to these islands, and added still another group to his discoveries, so leaving only the three southern atolls of the range unexplored. In October, 1825, on his second voyage, he again visited these islands, and added to his former explorations the four most northern groups of the Ratak Islands, the most eastern and western of which may be called discoveries, though he made most singular and confusing mistakes in giving native names, mistakes never before noticed, and which long perplexed Dr. Gulick.

In 1804, the English ship *Ocean*, and again in 1809, the brig *Elizabeth*, saw several of the middle Ratak Islands. But of all others, the most important name connected with the Marshall Islands is that of Kotzebue, of the Russian navy.

In 1792 Captain Bond discovered two of the Ralik Islands, and in 1797 Captain Dermott another.

After Kotzebue Captain Duperrey determined one group in 1824; since which they have been visited by Captain Hagemeister in 1831; by Captains Chramtschenko and Schanz of the Russian navy, in 1829, 1832, and 1835; by the United States' Exploring Expedition in 1840; Capt. Cheyne in 1845.

Several other visits to the different islands are also noticed by Dr. Gulick, but the most important event is the establishment of the mission under Dr. Pierson in Kusaie, in 1855, which was subsequently removed to Ebon, where it still remains under the charge of the Rev. Mr. Doane.

Two lines or chains of islands, lying nearly parallel to each other, and running N.W. and S.E., are included under the name Marshall Islands. The more eastern is the RATAK (the *Radaek* of Kotzebue), and the western is the Ralik. Each chain numbers fifteen low coralline islands. Several of these islands are very small, without lagoons; but the greater number are fully formed atolls, and some of them are of immense size.

The population of the archipelago does not, probably, number over about 10,000; 6,000 perhaps is the Ratak chain, and probably 4,000 in the Ralik Islands. And yet almost every one of their thirty atolls is inhabited; from which it may be gathered that the islands are but sparsely populated. Yet intercourse with a very considerable portion of the inhabitants is secured by taking a permanent station, for they roam in their proas from island to island of their respective ranges. There is comparatively little intercourse between the two principal chains.

Nominally each range is subject to a high chief, or more properly to a chiefish family. But several of the southern Ralik Islands are now independent of their feudal head, who lives on Aurh. So also in the Ralik chain, the four northern islands are held by a very slight cord of dependence.

The language of the two ranges is substantially the same, though there are dialectic differences. And though the vocabulary of this language differs from any spoken in the Caroline Archipelago, its grammatical construction bears the most striking similarity to those westward.

In physical appearance the people are not unlike the Caroline islanders, as described on Ponapi and Kusaie, save perhaps that they are a little coarser and more vigorous in their manners, and perhaps also a little darker complexioned. They seem more excitable and merciful than any of the Caroline islanders we have met; but this comes in part from their slight contact as yet with foreign vice and disease.

It is sad to be obliged to report that disease is now being rapidly introduced among the Ralik islanders by whale-ships passing the islands.

The RATAK CHAIN is the westernmost, and contains fifteen islands, in

the following order, commencing from the South, viz:—Mili, Macjuro, Ahrno, Aurh, Maloelab, Urikub, Wotje, Likieb, Jemo, Ailuk, Mejit, Utirik, Taka, Bikar, and Taongi. The last group, generally known as the Smyth Isles, is so far detached and uninhabited, that it will be described in the next chapter.

As the spelling of these native names differs so much from the previous orthography, the older form will be given in parentheses.

MILI, (*Mille*), or *Mulgrave Islands*.—The last of these names was given by their discoverer, Captain Marshall, in 1788. They were afterwards examined by Captain Duperrey and Captain Chramtschenko. The following account, by M. Dutailis in 1848, is the most explicit.

The Mulgrave islands appear to form a chain of atolls. Together they form a sort of quadrilateral figure, on one of the sides of which (that on the East) is a double belt of islands.

These islands, almost all of which are connected with each other at low water, are sometimes separated at high tides by the sea, which more often covering these reefs does not leave sufficient depth for a boat to be able to clear it for an extent of nearly 40 miles; for after a careful search, only one pass for a large ship and another for boats could be found.

Having been formed successively from coral, marine productions, and the debris of vegetation, they have in the course of ages acquired their great breadth. Here and there are grouped some trees, among which are the native houses. These smaller masses of verdure, intersected by sandy beaches towards the interior, and by coral blocks towards the outside, give to the chain the appearance of small islands, on which cocoa-nut trees, bread-fruit trees, &c., form clumps of beautiful verdure, having a most agreeable and cheerful appearance.

The parts covered with trees, being the largest, generally form the points around which the current runs very strong.

In general, the whole chain is very steep-to on the outside, and only increases on the side of the interior lagoon, where it is less disturbed by the sea, and where the coral banks are in course of formation, some of them already uncovered at low water, and projecting frequently a cable's length off the land. When they reach the level of the water, they become, like the islands already formed, covered in their turn by sand and some vegetables, and will in the lapse of time be of importance. The population is about 700.

The space enclosed by these islands is a real sea, navigable for every description of vessels. The bottom, generally at the depth of 22 to 27 fathoms, rises now and then nearer the surface, and shows in white patches, which thus indicating the dangers, also point out the points where the anchor may be dropped. These banks, bestrewed with rocks, are never-

theless dangerous to anchors and moorings, because they will break the one and chafe the other, of both of which Captain Dutailis says he had sad experience.

To take the best position, attention ought to be paid to the rise of the tide. Its level has great influence on the quality of the bottom, and it ought not to be chosen, if possible, but at low water. The passage for large ships is between *Barr Island* (pronounced as if three *r*'s) and the island of *Tokoea*, the first to the East and the other to the West of the entrance.

To reach the anchorage with winds from the eastern quarter, the only point for attention is to take up such a position as will allow you to range as near as possible to the pitch of the eastern reef, and rounding the bank attached to *Barr Island* as near as you please; it is shown by the whitish water; by this means you will avoid a small patch which is to the S.E., and over which the flood tide runs with a velocity of $1\frac{1}{2}$ knot. This patch is, until half tide, indicated by very strong rippings, and becomes nearly awash at low water.

In general, it is better to enter or leave with the tide, unless indeed the breeze is fair, and of sufficient force to overcome the strength of the current. The less distance you are inside the anchorage, the less difficulty there will be in getting out with westerly winds.

There is another passage, but for boats only, between *Anil Island* and *Bouguenieu*. *Bouguenieu* is the first islet to the West of *Tokoea*. The distance between these two passes may be about $1\frac{1}{2}$ mile.

Position of the anchorage, lat. $6^{\circ} 14' 37''$ N., long. $171^{\circ} 56' 6''$ E.

Captain Wilkes says they are in lat. $5^{\circ} 59' 15''$, long. $172^{\circ} 2' 33''$ (probably the S.E. part of the island), but his account will not coincide with that given above.

MAURO or *Arrowsmith (Meduro) Island*.—This is a discovery of Capts. Marshall and Gilbert, though their account and chart of it are not very definite. Captain Chramtschenko examined it in detail. The length, W.N.W. and E.S.E., is 18 miles, the breadth being 11 miles. It is of the usual coral formation, with a lagoon, and inhabited by about 1,000 people.

The eastern point of the island is broken, and there is a small opening for canoes, but Captain Brown, of the missionary ship *Morning Star*, says, that he found it continuous and unbroken for 24 miles, the reef and chain of islets being to the North. It is a magnificent island, with elegant forests of bread-fruit and pandanus. Cocoa-nuts, of course, abound, and bananas seem to be plentiful.

According to the United States' Exploring Expedition, the S.E. point is in lat. $7^{\circ} 5' 5''$ N., long. $171^{\circ} 23' 54''$ E., identical with previous observations.

ARHNO or *Daniel Island* and *Pedder Island*.—To the West of the foregoing the same ships discovered what they supposed to be two groups, to which these names were applied, calling the broad and open channel separating

North Pacific.

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them from Arrowsmith Island *Fordyce Passage*, but Dr. Gulick considers it as a single island. Captain Chramtschenko did not see them. Captain Hudson, U.S. Exploring Expedition, passed along the West side of Pedder Island, and through *Fordyce Passage*. He says that Pedder and Daniel Islands are of coral formation, and are inhabited. They are called *Arno* on Kotzebue's chart. The population is reckoned at 1,000. The N.E. point (of Daniel Island) on Wilkes's chart is in lat. $7^{\circ} 30' N.$, long. $171^{\circ} 52' E.$ The S.W. point (of Pedder Island), by the same authority, is in $7^{\circ} 11' N.$ and $171^{\circ} 40' E.$

AURH (Aur), *Ibbetson*, or *Traversey Islands*.—On Arrowsmith's chart a group, Ibbetson Islands, is marked, which beyond doubt are the same named by Kotzebue after the Marquis de Traversey, and by the natives Aurh.

This group is 13 miles long N.W. and S.E., and 6 miles broad. On the surrounding reef are thirty-two islands, the N.W. of which is *Pigen*. The population is numerous when compared with the other islands, but scanty for its size; it is about 1,000. *Stobual Island*, at the N.E. end, has a very pleasant aspect. The anchoring place was in lat. $8^{\circ} 18' 42''$, long. $171^{\circ} 12' E.$ (by chronometer, $171^{\circ} 8' 14''$). Kotzebue procured great quantities of coconuts here. Aurh is at the S.E. end of the atoll, and, as before mentioned, is the residence of the feudal chief of many of the groups.

MALOELAB (Kaven), or *Calvert*, *Bass Reef-tied*, or *Araktcheeff Islands*.—This group was discovered on board the ships *Scarborough* and *Charlotte*, June 29, 1788, and were named *Calvert Islands*, probably by Captain Gilbert. The *Nautilus* saw some islands, July 5, 1799, which were then named the *Bass Reef-tied Islands*, which are identical with the Calvert Islands. Captain Kotzebue says their native name is *Kaven* (or *Kawen*), and he applies the name of *Araktcheeff* (or *Araksheef*) to them. Dr. Gulick calls them by the first name.

This group is 36 miles long N.W. and S.E., and $11\frac{1}{4}$ miles broad. The whole cluster consists of sixty-four islands, and was well surveyed by Kotzebue. The group and its people are precisely similar to those of the *Wotje*, to the northward. *Kaven* or *Araktcheef*, to the N.W., is the largest island of them. It is $2\frac{1}{4}$ miles long and three-quarters of a mile broad. It is in lat. $8^{\circ} 54' 21'' N.$, long. $170^{\circ} 49' E.$ The S.E. island is in lat. $8^{\circ} 29' 30''$, long. $171^{\circ} 11' E.$ High water, full and change, $1^h 52^m$; greatest rise, 4 feet. Kotzebue found very good water in pits on some of the islands, but provisions were not very abundant.

Tjan is a well-cultivated island, and only useful trees, such as the coconut, pandanus, and bread-fruit are suffered there. The anchorage off this island is in lat. $8^{\circ} 52' 39'' N.$, long. $171^{\circ} 1' 31'' E.$ *Torua*, which is twice as large as *Tjan*, is in lat. $8^{\circ} 43' 10'' N.$, long. $171^{\circ} 9' 35'' E.$ Thence the atoll trends to the southward, and finally further south-eastward (the islands

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being generally small) to *Airik*, which is large (about the same size as *Torua*), and affords a more beautiful prospect than any of the other islands. There is excellent anchorage in 8 fathoms water, about 60 fathoms from the island, in lat. 8° 31' N., long. 171° 10½' E.; rise of tide 4 feet. The S.E. island is in lat. 8° 29' 30" N., long. 171° 1' E. *Olot*, off which there is anchorage in 8 fathoms, coral sand, is in lat. 8° 46' N., long. 171° 9' 42" E. (by chron.) The population is 1,000.

ERIKUB (*Egerup*), or *Bishop Junction Islands*.—This is four of two groups, which together were called the *Chatham Islands*, from the voyage of the *Scarborough* and *Charlotte*, probably by Captain Gilbert. The other group adjoining, *Wotje*, appears to have been considered as a portion of it, and Captain Marshall took them for the *Barbadoes Islands*, marked upon Anson's chart. They were surveyed by Kotzebue, who states the native name to be *Egerup*, and also gives the name of *Tschitschagoff* to them.

Erikub or *Egerup* lies to the southward of *Wotje*, and is considerably smaller. Its length is 24 miles, and its breadth is 4 miles. The whole circle consists of one reef, and contains but very few islands. The South point of it is an island, probably named *Egerup*, the only one seen with cocoa-nut trees and people; but these, it was said, were limited to one man and two old women. Dr. Gulick says that it is now uninhabited. A passage near this perhaps may be navigable, but is dangerous from its numerous turnings. There appears but little inducement for visiting the group. The South point is in lat. 9° 6' N., long. 170° 4' E.

WOTJE (*Otdia*) or *Romanzoff Islands* lie to the North of the preceding. The latter names are applied by Kotzebue, but the remarks relating to their earlier discovery also belong to those of the *Erikub* group, as above stated.

This group was minutely examined by Kotzebue, in January, 1817, and he has given a large and detailed chart of it. It is of an irregular oval form, 28 miles long in a W.S.W. and E.N.E. direction, by about 10 miles in breadth. It consists of the usual encircling reef, on which are distributed sixty-five islands, of various magnitudes. *Wotje* (*Wotye*) or *Otdia* is the easternmost and largest, about 2 miles long. The anchoring place inside the island, which was called *Christmas Harbour* (or *Port Noel*), was ascertained to be in lat. 9° 28' 9" N., long. 170° 16' 5" W.; variation, 11° 38' 30" East. As the low land here has no influence on the atmosphere, the barometer falls and rises as uniformly as it generally does between the tropics. The mean of the tidal observations at *Otdia* gave for the time of high water, full and change, 2^h 30^m. The greatest range was 7 feet. The people were very friendly to Kotzebue, who remained here a considerable time. To the South of it is an island called by Kotzebue *Egmedio*, near to the S.E. angle of the reef; to the South of it is a small high island.

The reef is quite continuous to the N.W. of *Otdia*, and on it stands a connected chain of small islands, reaching as far as *Ormed Island*, at the North

part of the reef, 8 miles from Otdia. The anchorage in this is in lat. $9^{\circ} 33' 16''$, long. $170^{\circ} 10' 58''$ E.; variation. $12^{\circ} 14'$ E.

From Ormed, the North side of the reef, also quite continuous, runs to W.S.W. 8 miles to *Bird Island*, and 9 miles still further to *Goat Island*, from whence to the West end of the reef is 5 miles.

There are several channels through the reef, all on the lee side. The first is $1\frac{1}{2}$ mile S.E. of the West point, narrow and impracticable; the next is *Rurick Strait*, 5 miles further round the reef, by which Kotzebue entered. From hence the reef continues, without islands, nearly 20 miles, to *Schischmareff Strait*, in every way preferable to the Rurick Strait, as a ship can beat in or out with the usual trade wind. To the East of this again is *Lagediak Strait*, 4 miles from the S.E. point of the group. The population is given as 300 by Dr. Gulick.

LIKIEB (Legiep) or *Count Heiden Islands*.—This group, first seen by Capt. Kotzebue, Nov. 5, 1817, perfectly resembles the others, though considerably smaller. Its greatest extent was 19 miles. There is a passage wide enough for a ship on the western side. The centre of the group is in lat. $9^{\circ} 51' 30''$ North, long. $169^{\circ} 13' 30''$ East. The natives of the islands are tall, handsome, robust men, advantageously distinguished from the other Radakers. They live chiefly on fish. Dr. Gulick states the population to be 300. In his second voyage Kotzebue examined the group more closely, and consequently found it was one-half larger than he at first supposed. On the N.W. of the group are several large islands, well covered with cocoa-nut trees. There are two broad entrances to the inland sea, which were accurately examined, and found to be perfectly safe for a ship-of-the-line, since, according to their direction, you may sail in or out with the trade-wind. From this cause, and the appearance of excellent anchorage, Kotzebue recommends this group to any navigator wishing to put into Radak. The N.W. point of the group is in lat. $10^{\circ} 3' 40''$ N., long. $169^{\circ} 1' 57''$.

JEMO (Temo) or *Steep-to Island*, a small island seen in the *Nautilus*, to which the latter name was applied. Captain Kotzebue says its native name is *Temo*, and is in lat. $9^{\circ} 58' N.$, long. $169^{\circ} 45' E.$, at the distance of 20 miles E.N.E. $\frac{1}{2}$ E. from the Legiep Islands. Population 200.

MEJIT (Miadi) or *New Year Island*, was discovered by Kotzebue, Jan. 1, 1817. It is a low, woody island, 3 miles long North and South, and three-quarters of a mile broad. From the North side a very long reef extends. They could not effect a landing on it. It is clothed with a lovely verdure, and is inhabited by a similar race to those on the Kutusoff Islands, but they are not more than fifty in number. The island seems to produce but little fruit. The position of the middle of the island is lat. $10^{\circ} 8' 27''$, long. $170^{\circ} 55' 34'' E.$

ALLUK or *Tindal and Watts*, or *Krusenstern Islands*.—Adm. Krusenstern considers this group to be the same as that named by Captain Marshall, in

1788, Tindal and Watt's Island. Kotzebue supposed it to be a new discovery, March 1, 1817, and applied the name of the great hydrographer to it. Its native name is Ailu (or Ailuk). Kotzebue surveyed it.

The group is 15 miles long and 5 miles broad. He entered it by a channel which was narrow, but deep towards the North part. The eastern side of the group is formed by a chain of islands, but the western side consists of a coral reef. *Ailuk* or *Ailu*, which gives its name to the whole, is in the South part. It is small, scarcely a mile long; it has a pleasing appearance, and is distinguished from the rest by its tall palm-trees. *Capeniur Island* is the northernmost of the group. Kotzebue's anchorage was in lat. $10^{\circ} 17' 25''$ N., long. $190^{\circ} 0' 40''$ W. High water, full and change, $4^h 53^m$; rise 8 feet.

UTIRIK (Udirick) or *Kutusoff*, or *Button Islands*.—On a chart inserted in the voyage of Governor Phillip, two islands are marked as the Button Islands, from the authority of Captain Marshall, 1788. They were not inserted on any other chart, and thus Kotzebue considered them as a fresh discovery, May 21, 1815, on his passage to Kamtschatka. This group and the next taken together have almost a North and South direction, and extend thus for $25\frac{1}{2}$ miles. *Kutusoff*, or *Utirik* (or *Ulerick*), is the only one inhabited. The island first seen by Kotzebue had a beautiful grove of cocoa-nut trees. The people came off and were friendly; they were of a black colour, with straight black hair. Present population only 20.

According to Kotzebue, the North point of the reef is in lat. $11^{\circ} 29' N.$, long. $169^{\circ} 54' E.$ Captain Moore, of the *Morning Star*, makes the centre in $11^{\circ} 20' N.$, $169^{\circ} 50' E.$

TAKA (Tagai) or *Souworoff*, like the former group, consists of small islands, connected by coral reefs, and seem to contain deep water in the centre. Though it is thickly covered with trees, not a single palm-tree was to be seen. It is uninhabited. The channel separating the two groups is $3\frac{1}{2}$ miles in length, free from rocks, and unfathomable depth. The latitude of the channel is $11^{\circ} 11' 20''$, long. $169^{\circ} 50' 37'' E.$

BIKAR (Bigar) or *Dawson Island*, is the northernmost of the islands hitherto considered as belonging to the Ratak chain. Its second name is derived from Captain Marshall's chart. Bigar, from the statement of a native to Kotzebue, forms a circle, consisting, for the most part, of reefs, and contains only two small islands; a third is laid in the middle of the basin, and all are overgrown with low bushes. There are some boat entrances, under the lee of the island, where the natives penetrate to catch turtle and sea-fowl. The centre is in lat. $11^{\circ} 48'$, long. $170^{\circ} 7'$. It is uninhabited.

Taongi or *Smyth*, or *Gaspar Rico Islands*, in lat. $14^{\circ} 30' N.$, long. $168^{\circ} 42'$ East, is an uninhabited group included by Dr. Gulick among the Marshall Islands. But as it is so isolated to the northward, it will be described in the next chapter.

Captain Moore, of the *Morning Star*, says :—The two chains, Ratak and Ralik (meaning East and West), might be regarded somewhat in the light of a large town, with alleys, streets, and avenues running through it, the inhabitants passing and repassing, engaged in like occupations, seeking the same amusements, and governed by the same laws. A great uniformity of character is observed.

That space of ocean comprehended between the two chains, and stretching from the Bonham Islands, on the South, to the Rimski-Korsakoff, on the North, we will call the "Radak Sea." This sea, 300 miles long and 100 broad, has been, as yet, but partially explored, and in which it is supposed there exist dangers of a formidable character. How far this may be true of the southern portion I am unable to say; but having made a cautious survey of the northern arm, I am prepared to believe that navigation is endangered more by conflicting currents than by labyrinthine reefs. As may be supposed, among so many islands, there is no regularity to the set of the current.

The **RALIK CHAIN** (the *Ralik* chain of Kotzebue) runs parallel to the Ratak chain just described, and extends to the same parallel of latitude. The character of the separate groups composing it appears to be the same, and the inhabitants of each are acquainted with each other. The islands of this range have not been so well examined (with some exceptions) as the eastern chain.

There is considerable confusion in the nomenclature, and a difficulty in reconciling the native names, as at present known, with the earlier discoveries. Of course, in many cases these identifications may be matters of opinion, and therefore unimportant; but with a view to including the earlier with the later decisions, the names as formerly connected with each other will be given where they differ from Dr. Gulick's arrangement, which will be followed here.

The fifteen islands or groups which compose the Ralik chain commencing from the northernmost, are—Bikini, Kongelab, Rongerik, Ailinginae, Wottho (or Kabahala), Ujae, Kwajalein, Namo, Lib, Jabwat, Ailinglabelab, Jaluit, Kili, Namerik, and Ebon.

KONGELAB (Bigini), or *Pescadore Islands*.—On September 3, 1767, Capt. Wallis discovered *two* islands, about 35 miles apart, which he supposed to be the *Pescadores* placed on Anson's chart; but, from some vagueness in his positions, they could not be well identified. Capt. Kotzebue, in his second voyage, has made the matter more clear by the discovery of *three groups*, of which the easternmost he supposes to be the group in question, and says its native name is Bigini; but Dr. Gulick applies this name to the Eschscholtz group. According to Kotzebue, it is a group of low, thickly-wooded, coral

islands, forming, as usual, a circle round a basin. The greatest length, East and West, is 10 miles. Their aspect is pleasant, but no sign of inhabitants; so that if they be really the Pescadores, the people must have long ago become extinct, as no monument of their existence is now visible. The centre of the group is in lat. $11^{\circ} 19' 21''$ N., long. $167^{\circ} 24' 57''$ E.

Captain Hudson, of the U.S. ship *Peacock*, says it is of a triangular shape, and has on its reef several islets and some sand-spits; the former are covered with a few low bushes, but it has no cocoa-nut or pandanus trees, and affords nothing but the pearl-oyster and turtles in the season. There are two entrances into the lagoon; one about the middle of the North side, the other on the East side. It had no inhabitants; but Dr. Gulick says that it has 120 inhabitants.

RONGERIK (Radokala), or *Rimski-Korsakoff Islands*, is the second of the three groups discovered by Kotzebue. He named it after his second lieutenant. It is, according to his estimate, 54 miles in extent, in an E.N.E. and W.S.W. direction; but it is now known to consist of two separate groups; its East point being in lat. $11^{\circ} 26' 45''$, long. $167^{\circ} 14' 20''$ E.

The U.S. Exploring ship *Peacock* examined it, but could not effect a landing on account of the surf. Although a few persons were seen on it, yet there was no appearance of permanent inhabitants. It seemed to be without any vegetable productions capable of sustaining life. Rimski-Korsakoff, though represented on the charts as one island, consists of *two*, as before said. The larger island is about 26 miles long, trending N.E. and S.W. It has an entrance to its lagoon on the South side. Population 80.

AILINGINAE, the smaller and south-western of the Rimski-Korsakoff Isles, is about 14 miles long by 9 miles wide. It is uninhabited. Its S.W. point is in lat. $11^{\circ} 8' 20''$ N., long. $166^{\circ} 26' 30''$ E.

BIKINI (*Udia-Milai*) or *Eschscholtz Islands*, is the westernmost of these groups. Kotzebue, in October, 1825, named this group after the naturalist of his expedition. He saw only the western part of the group, which he places in lat. $11^{\circ} 40'$ N., long. $166^{\circ} 24' 25''$ E. Captain Chramtschenko also saw only its western portion. "Next day we came up with an island named by the charts Eschscholtz Island. At noon, December 19th, 1858, we were close in-shore, in lat. $11^{\circ} 33'$ N., long. $165^{\circ} 37'$ E. Could see twelve islands lying in an East and West direction. We being about the centre, stood for a channel 3 miles in width between two islands. On getting near we could see the bottom stretching across; sent a boat to sound, found 11 fathoms, and sailed over, seeing very distinctly the various coloured corals comprising the reef under our keel as we dashed along. After passing this bar found ourselves in smooth water. Soon after saw land in the N.W. and also in the N.E., also a shoal with 10 fathoms water over it; of course I was now convinced that we had entered a spacious lagoon. I counted from aloft four-

teen islands, and the lagoon must be 20 miles across at least. We tacked and stood out, speaking a canoe on our way, with a chief on board, who informed us that the name of the group was Bigini. We cleared the western extremity at sunset, which is a circular reef. This part is very dangerous, as all the adjoining islets are small and very low, some of them having only a few bushes. I noticed one peculiarity in this group; the bars between the islands and shoals inside are more sunken than any we have seen heretofore, with several deep channels into the lagoon. They are a very fine race of people, if those in the canoe were a fair specimen. Dr. Gulick gives the population as 50.

WOTTHO or *Shanz Islands*, a group of thirteen islands, discovered May 30, 1835, by Captain Shanz (or Schantz), of the Russian navy, in the imperial ship *America*, on her passage from Port Jackson to Kamschatka. Mr. Reynolds mentions a group, discovered by a Captain Closly, near this longitude, about 30 miles to the southward, which prevents them being considered as the same. The Shanz Islands extend about 4 leagues from N.W. to S.E., and are 5 miles broad. Their centre is in lat. $10^{\circ} 5' N.$, long. from 8 chronometers, $166^{\circ} 4' E.$ Population 40.

Another announcement near this is *Kabahala Island*, from whaler report in lat. $10^{\circ} 5' N.$, long. $166^{\circ} 45' E.$ It is most likely the same as Shanz Island, but Captain Brown, of the missionary ship *Morning Star*, reports sailing over both these localities without seeing anything, but nevertheless there can be but little doubt of their existence.

KWAJALEIN (*Kwadelen*), or *Catharine Islands*.—The English ship *Ocean* discovered, in 1804, three groups of islands, which were named Margaretta, Lydia, and Catharine. The Islands Kwadelen (or Quadelen), *Namou*, and *Lileb*, placed upon Kotzebue's chart, so exactly agree with these three *Ocean Islands*, that there can be no doubt of their identity. The Kwajalein or Catharine Islands, the northernmost, are placed in lat. $9^{\circ} 14' N.$, and long. $167^{\circ} 2'.$

UJAE, or *Lydia Islands*, are the centre of the three groups above mentioned, and lie in lat. $9^{\circ} 4'.$, long. $165^{\circ} 58'.$

The *Serpent Group*, seen by Captain Hammond, R.N., in H.M.S. *Serpent*, in lat. $9^{\circ} 14' N.$, long. $166^{\circ} 2' E.$, are apparently the same as Lydia Island, but there is much confusion in the hydrography of these groups.

Captain Hammond saw a group of islands, surrounded by a reef, which consisted of a solid wall of coral, with 7 fathoms close to its edge, and 20 fathoms a boat's length off; although on the lee side of it a heavy surf was breaking all over the reef, through which the boat could not find a passage. Captain Hammond says he had just come from the Catharine Islands, and therefore considers this to be a distinct group; and as it was

not found on his chart, he named it the Serpent Group; the position he gives is nearly that given to Lydia Island.*

Lae, or *Brown Islands*, is a discovery in the missionary ship *Morning Star*, December, 1858. Her commander, Captain J. W. Brown, thus describes it:—"Sunday morning, the 19th, was surprised at seeing land very near ahead, as none is shown in my charts in that place. On coming up with it, found it to be a group of fourteen islands, encircling three sides of a beautiful lagoon, the western part being protected by a reef, with a small channel. A canoe came off, having two men on board. I gave them some presents, asked the name of the group, which is *Lai* or *Rai*, and left this little gem, the lagoon of which is about 4 miles across, and lies in North lat. $9^{\circ} 0'$, and East long. $166^{\circ} 26'$. The canoe brought off some very fine bread-fruit and cocoa-nuts." Dr. Gulick states that the population is 500.

NAMO, *Margaretta*, or *Paterson Islands*, is the southernmost of the three groups discovered by the *Ocean*. There can be no doubt of the identity of the Margaretta Island of the ship *Ocean*, in 1804, and the Paterson Islands of the brig *Elizabeth*, in 1809. This island, or as it appeared a group of islands, had a very fertile appearance, being one continuous chain of coconut trees. It lies about W.N.W. and E.S.E., low, and well wooded. Lat. of South extreme, $8^{\circ} 55' 48''$, long. $167^{\circ} 42' E$. It may be the *Dove Island* of Captain Moore, of the *Morning Star*.

JABWAT (or Tebut); or *Princessa Island*.—There is considerable confusion in the next three groups, arising out of the imperfect descriptions and vague positions assigned by different discoverers. Dr. Gulick considers this island to be the Bonham Island, discovered by the *Elizabeth* in 1809; but this cannot be, the latter is an extensive island. It is most probably the Tebut Island of Kotzebue's chart, and the *Princessa Island* of Captain Dennet, of the *Britannia*, in lat. $8^{\circ} 20' S$, long. $167^{\circ} 30' E$, which was also seen by Captain Hagemeister.

It was seen by Captain Dunn, of the barque *Dragon*, in 1856. He came within 5 miles of a small sand island with low bushes, 6 miles in circumference, inhabited, and surrounded by a coral reef 1 mile from shore. Lat. $8^{\circ} 20' S$, long. $167^{\circ} 46' E$. Notwithstanding the discrepancy of the size reported, they are probably identical. The mean of the positions given (excluding Kotzebue's longitude) is lat. $8^{\circ} 20' S$, long. $167^{\circ} 34' E$.

It was also seen by Captain Moore, in the *Morning Star*. He says:—"Going aloft, I perceived at once that we were approaching a compact, small coral island, not being more than a mile and a half in circumference. Well, is this a discovery? It is not marked down on the latest charts, either Eng-

* A group of islands, from whaler report, in lat. $9^{\circ} 1' N$, long. $164^{\circ} 40' E$, is very doubtful.

MARSHALL ARCHIPELAGO.

lish or American. Findlay says nothing about it in his description of the islands, and I know that it would be an easy matter for so small an island to be passed by and not seen. We landed on the West side. There were twenty-three inhabitants on the island, including men, women, and children. It was covered with a thick growth of pandanus, and a few low cocoa-nut trees. The position of the island is lat. $8^{\circ} 15' N.$, and long. $167^{\circ} 25' E.$

LIB may be a portion of one of the groups next described. It is stated by Dr. Gulick to have a population of 50, and he considers it to be the Princessa Island of Captain Dennet above described. Captain Moore places it in lat. $8^{\circ} 15' N.$, long. $167^{\circ} 28' E.$

AILINGLABELAB, or *Musquillo Islands*.—The name *Musquillo Group* was given by Captain Bond, who saw them the day after his making the Baring Islands, December 16, 1792. He ranged along the coasts of above twenty small islands, lying nearly S. by E. and N. by W. by compass. They all appeared connected by reefs and ledges, distant from each other from 1 to 6 miles. They are all well covered with trees, and full of inhabitants, which were seen in great numbers on the sandy beach. They are very low and dangerous, and a ship in thick weather might run on the reef without seeing the land.

According to Captain Chramtschenko, the group is composed of two portions joined by a very narrow isthmus. At a short distance it might be taken for two groups. The island forming the isthmus lies in lat. $8^{\circ} 0' N.$, long. $168^{\circ} 13'$; the northernmost island (Lib), lat. $8^{\circ} 10'$, long. $168^{\circ} 0'$; the southernmost, lat. $7^{\circ} 46'$, long. $168^{\circ} 23'$, so that the islands have an extent of 30 miles in a N.W. and S.E. direction. Their breadth is $11\frac{1}{2}$ miles. The name of *Lambert* was given to the northernmost portion, and *Rose* to the southern, by Captain Dennet of the *Britannia*, but the prior name must be that retained.

HELUT or *Elmore Islands*.—This group was named by the *Elizabeth*, in her passage from Port Jackson to China. The discoverer saw two small, round islands, moderately high, but Captain Chramtschenko says that it consists of a large island and nearly twenty smaller ones, connected by coral reefs, extending 20 miles in length from N.N.W. to S.S.E., and $12\frac{1}{2}$ miles in breadth. They are sometimes called the *Chramtschenko Islands*. The southernmost island is in lat. $7^{\circ} 15'$, long. $168^{\circ} 46'$, nearly according with the positions originally stated. Captain Chramtschenko says that the natives call this group *Odia*. On the charts by Kotzebue, and since followed, it is called *Helut*. They must be re-examined before any satisfactory designations can be applied to them.

JALUIT (*Kyli*) or *Bonham Islands*.—The brig *Elizabeth* discovered, in 1809, "a very extensive island, a group of islands joined together by low sand (coral?) banks, which I suppose are covered at high water. From one of

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It was visited by Captain J. W. Brown, in the missionary ship *Morning Star*. He anchored in its lagoon on December 2nd, near the spot where, 5 years since, a trading schooner was cut off. Captain M'Kenzie and all hands, save one, were killed. The Bonham Group, or Chelnitt (Jaluit) of the natives, is full 40 miles North and South. Its South point is in lat. 5° 47' N., long. 169° 36' E. In width it will average about 8 miles. Its form is irregular. The various islands are very beautiful, and abound with the same fruits as the Mulgrave Group. At our visit, breadfruit was out of season, and at such times cocoa-nuts and pandanus constitute their only food. The people number from 300 to 400 only. More shoals were found in this lagoon than in any we have seen. They are large and numerous; a vessel could hardly remain under way in the night without striking on them. They are composed of very sharp and hard coral, and we narrowly escaped once in the daytime, though we constantly kept a look-out aloft.—(*Nautical Magazine*, June, 1859, p. 283.)

KILI (*Namureck*), or *Hunter Island*.—This island was first seen by Capt. Dennet. It is stated to be 2 miles in extent from N.W. to S.E. The position assigned was lat. 5° 46', long. 169° 0'. Its position agrees with the *Namureck* of Kotzebue's chart, and was named Hunter Island. It is uninhabited.

NAMARIK or *Baring Islands*.—Baring Islands were discovered by Capt. Bond, in the *Royal Admiral*, December 15, 1792. They are two in number, both very low, and covered with trees, amongst which the cocoa-nut was very conspicuous. They appeared circular, and of no great extent, seemingly joined by a reef; they were named after the chairman of the court of directors of the East India Company. The position was only inferred as lat. 5° 35' N., long. 168° 13' E.

EBON, *Boston* or *Covell Islands*.—From information given by Captain Duperrey, these islands were discovered May 25, 1824, by an American

MARSHALL ARCHIPELAGO.

vessel, under Captain George Ray, who called them Boston Islands. The name of Covell (or Cowell) group is from an American commander, of the barque *Alliance*, who thought them a new discovery in 1831. Captain Hagemeister places them in lat. $4^{\circ} 39'$, long. $168^{\circ} 50'$. They are the southernmost of the Ralik chain. The following is a recent account of them :—

The group consists of thirteen low coral islands, covered with cocoa-nut trees, and connected by coral reefs forming a large lagoon inside. The group is 30 miles in circumference, has a good ship passage leading through the reef to the lagoon on the West side, and is thickly inhabited by an able-bodied race of men, who are of a light copper complexion. They have large canoes, or rather proas, capable of carrying fifty men. When Capt. ——— visited these islands, in February, 1845, he was attacked outside the reef by three proas carrying 150 men, and the vessel was nearly taken, but after a struggle, in which four of his crew were severely wounded, the vessel was retaken.

Besides the above, the group has many times been announced. They have been called *Linnes Islands* by a whale ship, and placed in lat. $4^{\circ} 30' N.$, long. $169^{\circ} 30' E.$ It is also called the *Fourteen Island Group*.

It is thus shown to be a thickly populated and very narrow strip, stretching quite 8 miles along the entire S.W., South, and S.E. border of the atoll. All the other islands are small; most of them were patches, so insignificant that Captain Cheyne counted only thirteen islands.

The group, according to these authorities, is in lat. $4^{\circ} 35' N.$, long. $168^{\circ} 47' E.$ Dr. Gulick says that the population is 1,000.

ENIWETOK, or *Brown Group*, was discovered by Captain Thos. Butler, in the ship *Walpole*, December 13, 1794. He named them Brown Range, after the chief super-cargo at Canton, and also the North Island *Arthur's Island*, lat. $11^{\circ} 43' N.$, long. $162^{\circ} 42' E.$, and the southern, Parry's Island, lat. $11^{\circ} 19' N.$, long. $162^{\circ} 52' E.$ They were more minutely examined by Capt. Fearn, in the snow *Hunter*, November 17, 1798. He named two other islands *East and West Danger Islands*. He says: Parry's Island is not only the southernmost of Brown's Range, but the eastern boundary of a most dangerous and extensive line of keys or shoals, which occupy more than half a degree of longitude, without a single apparent passage through which a stranger should attempt to go. Capt. Fearn's positions are identical with Capt. Butler's, but both are 27' too far East.

Dr. Gulick includes them in the Ralik chain of the Marshall Islands, although so far removed from them, and calls it by the first name. The few natives, only 30 in number, speak the Marshall Island language.

They were surveyed by Lütke, in November 1827. He ran along the coral reef forming its North and West sides for two days; on the reef are thirty

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low islands and reefs, enclosing a lagoon. It is a circular atoll, 20 miles in diameter from North to South, and 26 miles from East to West. Arthur island is in lat. $11^{\circ} 40' N.$, long. $162^{\circ} 15' E.$, the West extreme of the atoll in lat. $11^{\circ} 30' N.$ and $161^{\circ} 58' E.$, and Parry Island to the S.E. in $11^{\circ} 21' N.$, and $162^{\circ} 25' E.$

UJILONG, Arrecifos, Casobos, or Providence Islands.—On the early Spanish charts two groups, under the names of Arrecifos and Casobos or Casobas, where shown hereabout. But their existence was not verified till 1811, when the ship *Providence* discovered a group, to which the name of the ship was applied. Dr. Gulick, who calls the native name *Ujilong*, says that there is but one reef here, so it must include the two older notices. He says the population of Ujilong is 1,000.

It was visited in 1864 by Captain James, in the missionary ship *Morning Star*. He places it in lat. $9^{\circ} 52' N.$, long. $160^{\circ} 56' E.$ Other authorities place it in $9^{\circ} 31'$ or $9^{\circ} 36'$ and $161^{\circ} 8' E.$ Captain James says that it has the form of an irregular parallelogram, extending E. by S. and W. by N. 12 miles by 5 miles broad. There are ten islands on the reef, the largest one on the East end. Two passages lead into the lagoon on the South shore, the best of which is about 5 miles from the East point. Although to the westward of the Ralik Chain, the natives speak the Marshall Islands dialect.—(*Naut. Mag.*, 1864, p. 433.)

It was also visited by the *Dundonald*, Captain Kewley, in 1867. He speaks of the large quantity of cocoa-nuts, and places the southernmost island in lat. $9^{\circ} 47' N.$, long. $161^{\circ} 15' 45'' E.$ Captain Richards, of the ship *Charlotte Jane*, says (1868), that it is 12 miles long E.S.E. and W.N.W., and perhaps 7 to 10 miles from North to South. There are several islets in the lagoon, and the reef on the North side runs out 3 or 4 miles beyond the islets. The position accords with Capt. Kewley, so that the mean position of the centre of the atoll may be taken as lat. $9^{\circ} 39' N.$, long. $161^{\circ} 8\frac{1}{4}' E.$

In conclusion we may again refer to the unsatisfactory state of the hydrography of the Marshall Islands, and especially of the Ralik chain. It is impossible now to reconcile the early longitudes, and the great variations which are evident in this respect has led to very great confusion. Until a more complete examination of them is made, the nomenclature of the islands must remain in this confused condition.

THE CAROLINE ARCHIPELAGO.

This extensive range of islands was, until recent times, comparatively unknown. This ignorance, and the terrible accounts of their dangerous character given by various navigators who had crossed the chain, caused them to be the subject of the greatest dread to all commanders sailing in their vicinity. All these fears and doubts have, like most others of their kind, been dispelled by the more exact knowledge which modern science gives of the actual character of the subjects it is applied to. It is chiefly to the voyage of Captain Duperrey, in the French royal ship *La Coquille*, in 1823, and to the surveys of Rear-Admiral Lütke, of the Russian corvette *La Siniavine*, that we owe our present geographical knowledge of these islands.

It has been thought that the first notice of any portion of these islands was given by *Diego de Roche*, a Portuguese, in 1525, as the *Sequeira Isles*, but it is probable that his discovery was to the westward of the group. The same may be said of the *Reyes Islands*, discovered by Alvaro de Saavedra, in 1528. The first whose claims have any weight are Villalobos and Miguel Lopez de Legaspi; the first in 1543, the second in 1565, but neither of their discoveries can with certainty be recognised. The celebrated Sir Francis Drake also discovered a portion of the range, Sept. 30, 1779. The next in order is Lorenzo de Baretto, who, in 1595, saw a large inhabited island in the group.

In 1686 the Spanish admiral, Don Francisco Lazcano, discovered a large island, to which he gave the name of Caroline, in honour of the consort of the reigning king, Charles II., but which island it is not now known. It gives the name to the archipelago. The name of the *New Philippines* has also been applied, but that has long been in disuse.

Among the more complete early accounts of the Carolines is that by the Jesuit padre, Juan Antonio Cantova, who visited several of the islands in 1721, and during his second voyage thither, in 1731, was killed at the Island Mogmog. Several navigators have visited portions since that time, as is related in the subsequent particulars; but, as stated in the first instance, the chief sources of information are the works of Lütke and Duperrey. Of the first-named commander it may be stated, that it was his intention to have drawn up an account, strictly nautical, of the portions of the group visited by him, but it was omitted for want of leisure in the nautical portion of his work.

The Caroline Islands, according to Krusenstern and Lütke, extend from the Pelew Islands on the West, to Ualan on the East, and from 2° to 12° North

latitude. But this distinction is somewhat arbitrary. The natives of the Ratak and Ralik chains belong to the same race, so that the proposition of Dr. Chamisso to include all these islands in the single denomination of the Marianas is not without weight. But if it be necessary to adopt any divisions, it would be necessary to distinguish that part of the Carolines extending from the Mortlock to the Ouluthy group, which alone is inhabited by a nautical and commercial people. The nations more East or West do not participate in this distinction.

The information collected by the missionaries, and the charts drawn up by them from native reports, were for nearly a century the only guides to navigators. But they could neither determine their relative sizes or positions; so that many islands scarcely visible on the surface of the ocean, having a name as well as the larger groups, were placed as if miles in extent, and groups of 10 or 15 would occupy the extent of several degrees; this made the charts an inextricable labyrinth. Then the commanders who crossed the line of the archipelago in different directions, instead of meeting with entire archipelagoes, were astonished to find either no indications of land, or else some small spot to which they were delighted to apply some favourite name, which then took their places in the chart, without superseding the older ones. The native names also are frequently repeated, and disfigured both by the different pronunciation in various parts of the group, and by different systems of orthography. Such a chaos arose from all this, that any elucidation became a hopeless task. Such was the state of their geography before the *Coquille* and *Séniavine* cleared up all doubts, and declared their real character and number.

Among the later authors who have elucidated the geography of the archipelago in a more complete manner, may be enumerated Captain Cheyne, Commander of the *Naïad*, and the Rev. Dr. L. H. Gulick, of the Hawaiian mission, to whom we have before referred.

The Caroline Islands consist of forty-eight groups, forty-three of which are coral atolls, and five of them are basaltic surrounded by fringing coral reefs. These coral islands are immensely populous for their area. Capt. Lütke considered that the total length of these islands would not exceed 100 miles, and as most of them do not exceed 200 yards in breadth, the entire area of the habitable portion of the atolls would not be more than 15 square miles. Dr. Gulick estimates the area of the entire archipelago as 877 square miles, and the number of people in 1860 as 18,000. They are claimed as a Spanish possession, but it is merely nominal.

The inhabitants of all these islands are scions from the same stock. Chamisso considers them as the same as all the Malay tribes peopling eastern Polynesia. The works of Chamisso, the notices of Dr. Mertens, on the people, of Capt. Lütke, Kotzebue, and others, may be consulted with great interest on these and similar points.

Dr. Gulick says that many different dialects are spoken on its widely separated islands, though they are evidently dialects of the same mother tongue, and are strongly allied to the Marshall Island dialect, and even to the language spoken on the Gilbert Islands.

Climate.—We have no general account of the winds and weather of the whole archipelago, and from the fact that it lies in the belt of doldrums, or equatorial calms, there is considerable difficulty in defining the conditions of the weather in any particular seasons. Admiral Krusenstern says:—But we learn from the relations of several navigators that the N.E. winds are *not* the prevailing winds, which is confirmed by the fact that the inhabitants of several of the western islands having been carried in their canoes towards the East and N.E., a proof that during a portion of the year the winds blow from the West. The Pelew Islands are, as is known, in the limits of the monsoons, which may extend to the meridian of the Mariana Islands, and even some degrees beyond that, up to the point where they are arrested by the regular trade winds. This last part seems to be proved by the circumstance that the inhabitants of the Carolines, who perform their annual voyages from Lamurek to Guahan, situated several degrees to the East of that island, generally embark, from what M. Chamisso states, in April, returning in May or June; that is, they start towards the termination of the eastern monsoon, probably that they may not have long to wait for the return of the westerly monsoon, with which they return in May or June, when this monsoon is found to be in its greatest strength. M. Chamisso draws a conclusion from this opposite to that which M. Krusenstern does. He says that the islanders return in May or June, *before* the westerly winds set in; however, it is known that the westerly monsoon never comes later than the month of May.

The best account of the weather, &c., at Ponapi appeared in the *American Journal of Science*, from the pen of Dr. Gulick. The following is extracted from that account:—

No island of the whole range, not even of Micronesia (which includes the Gilbert, Marshall, Caroline and Mariana Islands), has yet been made a point for accurate meteorological observations, which will enhance the value of records on Ponapi.

"The following meteorological averages, deduced by Mrs. Gulick from her daily observations, extending through a period of three years, 1853—1855, will speak for themselves of the more important topics connected with climate. It is to be regretted that the want of necessary appliances has rendered these observations much less extensive through the whole field of meteorology than we would gladly have made them.

"*Average for three years*: Temperature.—Mean at sunrise, $78^{\circ}.28$; mean at noon, $83^{\circ}.31$; mean at sunset, $79^{\circ}.27$; maximum, 89° ; minimum, 70° ; range, 19° ; mean, $80^{\circ}.28$.

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"There are few who will not remark the astonishing uniformity of temperature exhibited in the preceding summary. It is to be questioned whether there exists a series of observations exhibiting as great a uniformity in any part of our globe. The South Seas, generally notorious as they are for salubrious equability of temperature, have probably not yet presented anything equal to this.

"The mean daily range is about 5°.

"The mean difference of successive days is about 1°.

"The utmost range of the thermometer, during three years was from 89° to 70° only 19°.

"The mean temperature of the three years was 80°.28.

"It should be remarked that the observations till May, 1853, were made in a most peculiarly unfavourable locality, which greatly exaggerated and distorted the thermometric conditions. The remaining observations were made from a locality such as would always be sought for a residence, and will without the slightest difficulty be found in every part of Ponapi. By these it appears that the yearly mean is about 80°.50; the utmost range about 12°; the mean at 7 a.m. about 78°; at noon, about 85°, and at 9 p.m., about 79°.50.

"Facts to be stated in connection with remarks on the winds and weather, will sufficiently account for this singular equability, particularly when it is remembered what an immense expanse of ocean surrounds all these Micronesian Islands.

Winds.—The following Table shows the distribution of the winds in the different months of 1854:—

Months.	Days of Trade-wind.	Days of Variables.	Calm Days.	Months.	Days of Trade-wind.	Days of Variables.	Calm Days.
January	29	2		July	11	11	9
February	28			August	7	24	
March	23	3		September	11	16	3
April	29	1		October	6	10	14
May	29	2		November	15	15	
June	22	8		December	29	1	

The predominating winds are the N.E. trades. During the northern winter, while the sun is in southern declination, and while, consequently, the whole system of aerial currents is drawn to the South, the island

North Pacific.

is fully exposed to their action. This period usually lasts from December to May, inclusive; though there is much difference in different seasons. At times the trades do not set in till January, and again they begin to blow steadily as early as November, and they cease blowing at any period from April till June. There are certain seasons when they are but faint, even during the dead of winter, as in January and February, 1856; and, again, they may continually intrude themselves during all the summer, as in 1856.

CURRENTS.—During the period when the N.E. trade is freshest, strong westerly currents are generally experienced. From the middle of August to the middle of November, when strong westerly winds, with heavy squalls, may be expected, strong easterly currents prevail.

On the subject of currents, they have been found very violent to the South of the Pelew Islands, bearing to the East, at the rate of 2 or 3 miles an hour, particularly in the months of June, July, and August, that is, during the strength of the S.W. monsoon. In the memoir on the currents, mention is made of this current, which occupies a zone of 60 or 70 leagues in breadth, and extends from the Pelew Islands to the meridian of 148° or 150° E. longitude.

GALES.—It may be remarked that the severer class of gales are comparatively unknown here. The typhoons of the China Sea, and even of the seas North of the Marianas, about the Bonin Islands, rarely (if ever) extend to this island. Yet once, during the youth of a few of the very oldest inhabitants now living, a desolating wind swept over the island, so tearing up the bread-fruit trees—the principal reliance for food—that an awful famine ensued, and large numbers died. It would seem possible that this was a cyclone. And it is very interesting that a similar gale produced similar results at Kusaie, or Strong Island, 5 degrees East of Ponapi, and that, too, in the memory of the very oldest inhabitants. May not this have been the very same erratic cyclone that swept Ponapi?

WEATHER.—Without being able to give accurate udometric figures, the observations recorded regarding the general character of the days exhibit the fact that there is much humidity, though nothing excessive. Situated just on the southern confines of the N.E. trades, and under the northern edge of the cloud zone that hovers over the equatorial regions between the two trade wind zones of the North and South hemispheres, the island is constantly exposed to precipitations from above. Before the trade winds reach the island, they have made their passage over thousands of miles of ocean, and have become saturated with moisture; so that, as soon as they impinge on the central elevations of the island, some of which are 2,858 feet in height, the clouds are arrested, and showers fall; and, as the island is but little more than 15 miles in diameter, they readily pass over them and water the lee no less than the windward slopes. And again, during the summer, while the

trades have receded northwards, we are, ever and anon, shaded by the equatorial clouds, which pour their contents most bounteously; yet we are constantly so near the northern boundary of this zone, that we do not experience its severer, its protracted and unpleasant pouring rains of weeks and months. The humidity is consequently more equably distributed through the year than in most tropical regions; yet we speak of the summer as the season most rainy, if not as the "rainy season." It must be remarked, however, that the year, 1856, during which the trades were very faint through all their usual months, and were quite intrusive through all the months during which they usually absent themselves, was the most dry remembered by the oldest inhabitants.

Of the *electric phenomena*, I can only report that thunder is rare and lightning still rarer. Thunder was heard only twenty-eight days in three years, and lightning seen only eight days. So very seldom does lightning prove destructive, that the natives have never suspected its agency, but attributed its results to a direct visitation from their *Ani* or Spirits, the only gods they reverence.

The *orthography* here adopted is that given by Dr. Gulick, as based upon the system of Lepius, established by his mission. As may be well understood, there is much confusion in the early names, each voyager spelling the difficult native pronunciation in his own national method.

The description of the archipelago begins with the easternmost, and proceeds in a westerly direction.

KUSAIE (Ualan), or *Strong Island*.—This is the easternmost, and one of the lofty basaltic peaks of the Caroline Islands; it was discovered, in 1804, by Captain Crozer, commanding an American ship, who gave it the name *Strong*, after the governor of Massachusetts. Captain Duperrey sought for and found it in June, 1824, proving that Captain Crozer's position was very exact. He passed ten days here, and made a minute survey of it. "The Island of Oualan," says Captain Duperrey, "may at some future time become of great importance. Lying in the track of vessels going from Australia to China, it offers at the same time good ports for carenage, abundance of water, and refreshments of different sorts."* The island was also visited by Captain D'Urville and by Captain Lütke, the latter giving the following account of it:—Ualan is 24 miles in circumference. It is of volcanic formation. A break between two masses of mountains, which extend across the island from West to East, divides it into two unequal parts, the southern portion being more than double the extent of the northern. On this northern portion is *Mount Buache*, so named by Duperrey, which is 1,914

* Voyage de la *Coquille*; et Observations sur l'Île de Oualan ou Strong, par M. Lesson, médecin, &c.; Journal de Voyages Mai, 1825.

feet according to Duperrey, or 2,160 feet according to Lütke, above the sea level. From its rounded summit it falls gradually on all sides. On the southern portion, *Mount Crozer*, 2,152 feet above the sea, was named after the discoverer of the island. Its crest extends from N.W. to S.E.; the North flank is very steep and rugged at its summit. In general this portion of the island has many peaks, both isolated and coupled in the form of asses' ears. One of these peaks, more remarkable for its regularly conical summit, and by its position in front of Coquille harbour, was named the *Mertens' Monument* by Lütke, from his lamented naturalist.

The northern part of the island is surrounded by a coral reef, which, opening before the break between the mountains, forms a fort on each side of the island; that to the West is what Lütke used; that to the East is what the islanders call *Ninmolchon*, and Captain Duperrey *Lélé*,* from the name of the small island found in it. The southern part is surrounded by a chain of coral islets, connected by reefs, and forming on the side towards the island a shallow lagoon, through which this part of the island may be traversed. The reef is broken towards the southern part of the island, forming a small port, named by the French *Port Lottin*.

The shore, sheltered by the reef from the violence of the waves, is surrounded by a broad belt of mangroves and other shrubs, forming a thick wall of verdure, which at first pleases by its singularity, but the monotony of which soon fatigues the sight. This belt also, hiding the real shore, renders it difficult to determine the exact limits of the island, and also by its nature renders it constantly liable to change.

In general the whole island, from the sea to the mountain tops, with the exception of the highest and most peaked summits of Mount Crozer, is covered with a thick and almost impassable forest. In the neighbourhood of the houses, this wood consists of bread-fruit, cocoa-nut, bananas, and other fruit trees. The break or valley between the two ports is the only part by which you can pass from one side to the other. The distance is only 2½ miles, but the road is unpleasant from the marshy pools, especially after rain.

Rivulets and water-courses are met with at every step. Their number, and the richness of the vegetation, attest the humidity of the climate, unusual in these latitudes. It did not, however, appear to be unhealthy. The villages are chiefly placed along the beaches, but are not much seen from seaward, as they are hidden by the coral islets and mangroves. They are all surrounded with stone walls, separating the properties. The number of inhabitants in the fifty small villages enumerated by Lütke amounted to 409 men and 301 women. Dr. Gulick gives the same numbers as the total population.

* "The natives do not pronounce it *Lélé*, but *Lella*."—*Lütke*.

Port Lele, or *Pané Bay* of the natives, is where the chiefs and the major part of the population reside. It is the most spacious; but as it is on the eastern side of the island, and the prevalent winds are from the eastern quarter, it is not easy to leave it, the more so because there is no sounding in the entrance. This is the harbour usually resorted to by the American whalers.

It was visited by Captain Hammet in *H.M.S. Serpent*, in January, 1853. The king, who was called King George, but whose proper name was Keru, must have commenced to reign in 1837 or 1838, and was found there by Dr. Gulick. Captain Hammet describes some remains of stone architecture, also alluded to by D'Urville, which was the subject of much speculation. But Dr. Gulick ascertained that they were not ancient, but were built for protection, and in some cases as monuments.

The people are saturated with disease, introduced by the whalers, and are rapidly on the decrease.

Coquille Harbour, where Duperrey's vessel anchored, is on the western side of the island, which gives it a great advantage over Port Lele. The sea is here as calm and tranquil as a mill-pond. The anchorage is excellent, and very tenacious, on a bottom of black mud, near to two small islets lying in the bottom of the harbour.

The Island of Kusaie or Ualan will serve as an excellent place for refreshment, and particularly for the whalers or vessels proceeding to China by the eastern route; a tranquil harbour, a fine climate, an abundance of fresh water and fruits, are great advantages, all to be enjoyed here.* An abundance of sea-provisions must not be expected here; there is no fear of want for daily consumption.

The position of the N.E. islet in Coquille Harbour is lat. $5^{\circ} 21' 20''$, long. $163^{\circ} 1' 0''$ E. Captain Lütke makes the centre of the island in lat. $5^{\circ} 19' N.$, long. $163^{\circ} 6' E.$

Mackaw Reef.—On October 11, 1856, the ship *Indiana*, Captain Mackaw, discovered a reef awash in lat. $3^{\circ} 20' N.$, long. $160^{\circ} 18' E.$ Good observations are claimed for this position, as the chronometers were rated 11 days before at Mitre Island. It was about a quarter of a mile in extent N.E. and S.W. The lookout at the masthead also saw broken patches of water to the eastward; and another patch of breakers was seen from the fore-castle to south-westward about $2\frac{1}{2}$ to 3 miles distant from the ship. A cast

* A good supply of yams and fowls can be obtained from the natives. Two vessels were cut off some years ago; but of late the natives have got the name of being friendly and hospitable. Strangers, however, should not allow too many of them on deck; and have their boats armed when wooding and watering.—*Captain Cheyne*, 1848.

of the lead while passing between the two reefs gave no bottom at 12 fathoms, ship going 8 knots.*

PINGELAP, *Musgrave*, or *Mac Askill Islands*.—According to Arrow-smith's chart, Captain Musgrave, in the ship *Sugar-cane*, discovered some small islands, in 1793. They were placed in lat. $6^{\circ} 12' N.$, long. $159^{\circ} 15' E.$ According to Horsburgh, Captain MacAskill, of the ship *Lady Barlow*, on her passage from Port Jackson to China, discovered, October 29, 1809, two islands covered with trees, extending about 3 leagues S.E. and N.W. By good observations the centre was found to be in lat. $6^{\circ} 12' N.$, long. $160^{\circ} 53' East$. Admiral Krusenstern applied the name of *Musgrave Islands* to the first discovery; that of *MacAskill* was given to the second. Notwithstanding the difference of longitude (perhaps owing to the effect of currents), it cannot be doubted that they are the same. Captain Duperrey places the southern one in lat. $6^{\circ} 13'$, long. $160^{\circ} 47'$; the northern in lat. $6^{\circ} 12' 50''$, long. $160^{\circ} 47' 20''$. Although they are placed on the charts under the name of MacAskill, if it should be proved that there is but one, that of Musgrave has the claim of priority.

The two islands are called *Takay* and *Pingelap* (Pelelep of Duperrey), and together are not more than $2\frac{1}{2}$ miles in extent. They are covered with cocoa-nut trees, are of coral formation, and connected by coral reefs, forming a lagoon inside, with a good ship passage through the reef on the West side leading into it. The group is about 15 miles in circumference, and is inhabited by 300 people, a light-complexioned race, who must not be trusted; they live chiefly on fish and cocoa-nuts. The reefs produce biche-de-mar, but not in any quantity.

MOKIL, *Duperrey* or *Wellington Isles*, a group of three coral islands, very close to each other, were discovered in *La Coquille*, June 18, 1824, and named after her commander. The three islands are named *Aoura*, *Ongai*, and *Mougoul*. The N.E. point of Aoura is in lat. $6^{\circ} 41' 45'' N.$, long. $159^{\circ} 50' E.$ They occupy an extent of less than 10 miles (Capt. Cheyne says 3 miles), nearly North and South.

Captain Cheyne says they are called the Wellington Isles. They are covered with cocoa-nut trees, and are connected by coral reefs, forming a lagoon, with a passage on the N.W. side, leading to the lagoon. The reefs produce biche-de-mar, and a good supply of cocoa-nuts may be obtained for trifles.

Captain Hammet, H.M.S. *Serpent*, found, in Jan. 1853, that an American, named Lucien Huntington, was living on one of the islands, and that the na-

* *Atlantic Island*, lat. $1^{\circ} 10' N.$, long. $164^{\circ} 57' E.$, has been only reported once, in 1827. Its existence and position require confirmation.

A reef, from whaler report in lat. $2^{\circ} 25' N.$, long. $153^{\circ} 50' E.$, requires confirmation.

tives (now about 80 in number) were quiet and inoffensive, and quite under his control. He had a flagstaff on which he hoisted a flag to attract passing ships. Pigs, fowls, turtle, and taro were procured from him. The only water was river water, and the only wood is the cocoa-nut tree.

PONAPI, *Ascension*, or the *Seniavine Islands*.—This group, consisting of three separate groups, one of which contains the largest and highest island of the Carolines, it is very singular should be one of the latest discovered. It was first announced by Captain Lütke, who saw it Jan. 2, 1828, in the Russian corvette *Séniavine*, and was named after the officer whose name the vessel bore. But it is more than probable that it had been visited before this.*

The *Séniavine Islands* lie between lat. $6^{\circ} 43'$ and $7^{\circ} 6' N.$, long. 158° and $158\frac{1}{2}^{\circ} E.$ In the principal island the word *Ponapi*, *Bonabi*, *Bornabi*, *Pouynipète*,† or *Painipète*, was constantly pronounced by the natives, and may be undoubtedly recognized as the *Faloupet* of Père Cantova; *Pouloupa*, of which the Ougai islanders spoke to Capt. Duperrey; and *Fanopé*, mentioned by the natives of Kadu to Kotzebue. By the name *Ponapi*, or by that of *Fanounpei*, it is known throughout all the western groups of the Carolines.

It is surrounded by a coral reef, $18\frac{1}{2}$ miles from North to South, 17 miles from East to West, and about 60 miles in circumference. The large island

* Captain Cheyne says: "Near Metalanien Harbour are some interesting ruins, which are, however, involved in obscurity; the oldest inhabitants being ignorant of their origin, and having no tradition bearing any reference to their history. That a fortified town once stood upon this spot, and not built by savages, cannot be doubted; the style of the ruins giving strong proofs of civilization. Some of the stones measure 8 to 10 feet in length, are squared on six sides, and have evidently been brought thither from some civilized country, there being no stones on the island similar to them. Streets are formed in several places, and the whole town appears to have been a succession of fortified houses. Several artificial caves were also discovered within the fortifications.

"This town was, doubtless, at one time, the stronghold of pirates, and as the natives can give no account of it, it seems probable that it was built by Spanish bucaniers, some two or three centuries ago. This supposition is confirmed by the fact that, about three or four years ago, a small brass cannon was found on one of the mountains, and taken away by H.M.S. *Larne*. Several clear places are also to be seen a little inland, at different parts of the island, some of which are many acres in extent, clear of timber, and perfectly level. Upon one of these plains, called K-par, near Kiti (Roan Kiddi) Harbour (and which I have frequently visited), is a large mound, about 20 feet wide, 8 feet high, and a quarter of a mile in length. This must evidently have been thrown up for defence, or as a burial-place for the dead, after some great battle.

"Similar ruins are to be found at Strong Island, of which the natives can give no account."

† "The first syllable of this word cannot be exactly rendered; it has, in the lips of the natives, a strange and savage sound, extremely difficult to pronounce, and disagreeable to the ear."—Lütke.

of Ponapi or Ascension, which gives its name to the group, occupies the centre, and is 12 miles in diameter from North to South, and $14\frac{1}{2}$ miles from East to West, occupying nearly the whole of the area enclosed by the fringing coral reef. Besides the chief island, a dozen basaltic islets and rocks surround the island, while on the coral reef are from fifteen to twenty coral islands, resembling the ordinary atolls.

Its highest point, *Mount Monte-Santo*, so named in memory of the naval victory gained over the Turks by Admiral Séniavine, is 2,858 feet (English) above the level of the sea.

On its N.W. portion is a spot that is entirely flat, from which the land rapidly falls towards the N.W. point of the island, *Cape Zavalichine*, named from Lütke's officer. This is remarkable for a rock about 1,000 ft. in height, nearly perpendicular, and which seems to be of basalt. In other directions the land slopes gradually from the summit to the shore. On the South side is an isolated and very distinct mass of basalt, which, seen from East to West, exactly resembles a lighthouse or a sentry box.

From what could be judged of the principal geological formation of the island by what was seen, it is, like all the other high islands of this sea, of basalt. It is, like those surrounded by a coral reef, on which some islands, of different sizes, also of coral, are dispersed; but in Unwelcome Port, and a little further to the East, there are, even close to the shore, some high islands. Some of these are thickly wooded and inhabited. The island is entirely covered with verdure; but it seems less thickly so than Ualan. To leeward, that is, on the South and West sides, mangroves and other shrubs grow in the water, forming an impenetrable border.

There are but very few habitations seen near the sea-shore; the greater part are hidden by the trees, but the smoke rising in numerous points, and the large clumps of cocoa-nut trees, attest the numerous population. The number of people is estimated at 5,000.

The whole island is thickly wooded, and produces many varieties of good timber. The shores are fronted with mangrove trees, growing in the salt water, which form an impenetrable barrier to boats landing, except in the rivers, and other small canals or channels, formed amongst them by nature. Many of these are so narrow as scarcely to admit of oars being used; they answer every purpose however, as all the houses situated near the shore have generally one of these channels leading to them.

The Rev. Dr. L. H. Gulick has given an interesting paper on the climate and productions of Ponapi in the *American Journal of Science*. In a former page we have made some extracts from this as regards the climate. The following is a description of the group.

The height of what Lütke named Monte Santo (on the French chart *Tolocolme*), in about lat. $6^{\circ} 53' N.$, is 2,861 feet. Several other points approach it in elevation. A somewhat continuous range of hills extends from Uu, of

the Waneka district, westward to Paleka, of the Jekoits district. The terminations of the range are somewhat gradual slopes. The general line of the range is that of a curve, convex southward. The eastern third, or perhaps half, is narrow and almost equally precipitous on the northern and southern aspects, presenting in many places, as in Uu, perpendicular faces of rock of great height, that show strong columnar tendencies. The middle third of the range slopes very gradually on the southern aspect, where the mountains maintain a comparatively regular descent from their summits to the ocean shore, a distance of 5 or 6 miles. Several long narrow valleys run up these slopes, along the sides, and at the heads of which are many faces of columnar rock, over which leap the most romantic cascades. Again, the western portion of the range is narrow and precipitous.

A number of detached hills and short ranges still further diversify the scene, more particularly the following. Midway between the Metalanien Harbour and Aru Point, there rises a very high hill, of perhaps 1,000 feet, which sends westward a low prolongation that connects it with the main central range. Again, on the North of the island, in the Nut district, there rises a similar mountain, but barely connected with even the mainland. At this place the most perfect basaltic columns are found. The central ridge of Nut is but a prismatic mass, and about its base lie scattered columns of great length, also detached piles of agglutinated columns are found. This must have been, I think, at least one of the spots whence the materials for the Metalanien "Ruins" were taken.

By the course of the main range and the positions of the subsidiary hills, two broad and long valleys are formed. One of them may be called the Metalanien, the other the Nut valley. Each of them may be 4 to 5 miles in width, and 6 to 8 miles in length.

There are several solitary projections of rock in the Metalanien and Kiti district. One, much resembling a sugar-loaf in shape, in the Metalanien valley at the head of the harbour of the same name, is called *Takain*. Its height may be 400 feet, and its circumference at the base three-quarters of a mile. Its eastern aspects are perpendicular, its western not so steep but that by adhering with hands and feet it may be ascended. Adherent to the base of the main rock, yet separated from it above, is a much smaller rock. Within a quarter of a mile of *Takain* rises a dome-shaped hill, of almost the same elevation, but not so precipitous. At the head of the Panian Harbour a needle-shaped rock elevates itself from the top of a slight ridge. It may be 10 or 12 rods at the base, and perhaps 150 feet high above the top of the ridge. On Lütke's chart it bears the name of *Mount Guerite*; on the French chart *Roi*. In the West end of the island is another needle rock, much like *Mount Guerite*.

A number of very active streams pour through the valleys on the southern side of the island. The largest is probably that emptying at the base of

Takain. On the North of the central range there are no streams, save one or two draining the Nut valley. These streams, during the course of ages, must have effected great things. I question whether any bodies of water in the world are more active than these. During freshets, which occur with almost every heavy shower, they are deeply perturbed by the black and red earths with which they are laden. These alluvial substances are deposited along the shores, forming in many places immense flats, over which the tide ebbs and flows. It is only on the South side of the island, from the Metalanien Harbour to Point Kittlitz, that these marshes are of any considerable extent, for on this side alone are the principal streams, and these S.W. shores are protected from the roughened ocean, acted upon by the N.E. trades. The island at the mouth of the Nut valley is but one of the alluvial marshes.

The insulated basaltic points about the main island of Ponapi are very interesting features of the group. *Mutok* (or Tenedos, as named by Lutke), is in reality an island, being only attached to the main land by an extensive alluvial marsh. It is a sort of double hill, rising very precipitously on its eastern aspect 150 or 200 feet. *Jekoits Island* is an irregular triangle, each side being perhaps a mile and a half. Along the eastern border, running North and South, is a high ridge, 800 or 1,000 feet in height, exceedingly precipitous. The north-western part of the island is elevated from 150 to perhaps 250 or 300 feet, and along its northern and western shores presents very precipitous ascents. The columnar tendency may be seen in most of the ledges of this island, though perfect prisms are rare. *Lungur* and *Poitik* are but points of columnar basalt, 100 feet or so in height, with a *talus* about their bases, their circumference at the water's edge being, perhaps, half a mile. *Parum* is about $1\frac{1}{2}$ mile in length, and in one place half a mile in width, with a central ridge that may be at points 300 feet in height.

The *Mantapeti*, or *Mants*, rise very abruptly from the water's edge. The smaller of the two is a sort of dome, though presenting in many places faces of perpendicular basalt. About its eastern shore are considerable hillocks of coarse conglomerate.

The larger Mant is but the crest of a ridge of prismatic rock that along its whole western aspect presents a very precipitous face, and may be in one place 300 feet high. *Tupak* is but a repetition of the same, of less elevation. *Takain* rises with much of the usual perpendicularity to the height of perhaps 300 feet. The mass of its hill is of a reddish rock; and in certain spots a red earth is found that makes an admirable paint for native canoes; a substance that is also found in almost every part of the main island. *Mutokaloj* is about 50 feet in height, and is very small. Only on the margins of this islet have I succeeded in finding anything approaching to cellular lava. *Taman Island* has a general level of about 75 feet, and descends quite steeply

to the water on nearly every side. Near it, to the South, are several very small and low basaltic islets.

It need scarcely be remarked that the general surface of all the basaltic members of the Ponapi group is very rugged. Rocks and stones are scattered over almost the entire surface in the greatest profusion; and but few plains, even of a few acres in extent, are to be anywhere seen. The leeward slopes in the *Kiti* district present a few spots that may be termed level. Basaltic specimens may be found on almost every square rod of the island, but on certain spots they seem to be adventitious rather than native. In such spots the earth is a reddish clay, under which will usually be found what seems to be a decomposed rock with frequent seams of red earth. Beneath the whole we strike upon the substratum of basalt, in compact masses.

Surrounding the whole body of basaltic elevations is a beautiful coral reef, distant from the coast of the main island the average distance of perhaps 2 miles. There are no less than *seven considerable intervals in the continuity of this reef, forming as many harbours, several of which are really excellent.* Between the reef and the shore of the island are all the usual coral patches that give such wondrous variety to tropical waters. The height of these patches varies greatly. A very considerable number of them are from an inch or two to a foot or more above the ebb tides at syzygies. On the outer reef are a number of islets in every respect similar to those on the purely coralline groups. They are found from the mouth of the Metalanien harbour, along the southern line, as far as Point Kittlitz, but not on the North of Ponapi. These islets have a nearly uniform elevation of about 2 ft. above high water mark. I gather from my own observations, and from the reports of the pilots, that soundings are found outside of the reef, nearly if not quite round the island, at distances varying from a quarter to half a mile from the reef.

Of its harbours Captain Lütke has given us no account, as before stated. He sent Lieutenant Zavalichine, January 3, 1828, to examine one, at the South end of the island, in an opening of the reef, and leading towards what is marked on his charts as *Mounts Tenedos* (Mutok) and *La Guérite* (the sentry box), before alluded to. This entrance is in lat. $6^{\circ} 45' N.$, and long. $158^{\circ} 24' E.$

Kiti, or Rono Kiti Harbour.—Captain Cheyne first described this harbour in 1848. It is the one most resorted to by the American whalers.

A vessel bound to this harbour from the eastward, from December till April, should endeavour to get into the latitude of the island as soon as possible, after passing the Duperrey Isles, and continue running to the westward on the same parallel of latitude, until the island is sighted, as strong westerly currents prevail at times during these months, with much hazy weather; and a stranger would be liable to get set past the island, if a proper allowance were not made for the current. After making the land, con-

tinue steering to the westward, until the reef is visible from the deck; at which time, if the weather be moderate, it is presumed a pilot will be alongside.

The harbour forms a snug basin, where a ship can lie as safe as in a dock. The entrance, however, is very narrow and intricate; the narrows for about 200 yards, being only 40 fathoms wide. The outer entrance is between the two small woody islands named Nalap, and Namaur, a sandy islet with bushes on it, situated on the reef, to the eastward of the former. The channel is 4 cables wide, between Shaulak or Little Nalap and the sandy islet. The largest, Nalap Island, is $2\frac{1}{2}$ cables in length North and South, and the inner one two-thirds of a cable in extent. The Sandy Islet, on the starboard hand going in, is about three-quarters of a cable in length. The distance from the entrance to the narrows is nearly a mile North and South (true) mid-channel. In entering, the elbow of the barrier reef to the southward of the sandy islet, should have a berth of $1\frac{1}{2}$ cables, as a coral spit extends from it some distance. In the middle of the outer bight or harbour, the depth is 45 fathoms, decreasing gradually towards the narrows, where it ranges from 10 to 15 fathoms. A detached sunken rock, with only 4 ft. on it, lies in the outer entrance of the narrows. This must be left on the port hand going in. The course through the narrows is N.W. $\frac{1}{2}$ W. (true). When inside, the water deepens to 20 and 25 fathoms, and then gradually shoals to the anchorage at the head of the basin. The harbour or basin is 7 cables in length, N. by E. and S. by W. (true); and between the narrowest part of the reefs which form it, $1\frac{1}{2}$ cables in width. The best anchorage is at its head, in 7 or 8 fathoms, where the port has a diameter 2 cables each way, without going under 5 fathoms. The reefs which form this harbour, dry at low water, spring tides on each side, and at the head of the basin.

Kiti or Roan Kiddi River is about a quarter of a mile from the anchorage, from whence a plentiful supply of good fresh water can always be procured, and an abundance of firewood can be easily obtained on the low land, at the mouth of the river. It is high water at this place on full and change of the moon at 4^h; rise and fall, $5\frac{1}{2}$ ft. A stranger before attempting to enter this harbour will require to send a boat in, and place buoys on the rocks and E. side of the channel.

By having a careful officer at the mast-head, when running in, all dangers can be seen and avoided in a clear day. The best time to enter this harbour is on the first of the flood; as, should a vessel unfortunately get on shore, through a sudden shift of wind, while passing the narrows, she will stand a much better chance of getting off without injury than at any other time.

The ensuing remarks are from the remark-book of H.M.S. *Larne*, 1839 :
"After passing an outer bight or bay, formed by the outer reefs, in which

there is nothing less than 45 fathoms, a N.W. course leads for the inner passage, which, for about 200 yards, is 80 yards wide between a sunken rock, with 4 ft. on it on the port hand, and the line of the inner reef very steep-to (7 fathoms), which should be hugged as closely as possible. The course through the narrows is N.W. by W. : but a fixed course or marks are unnecessary, as a ship would always pass in and out as the *Larne* did by the deep water, as distinguished by the eye when conned from the fore-top-gallant mast-head. The ordinary N.E. trade is a leading wind in, with very smooth water, and when through the narrow, it is requisite, if possible, to shoot to starboard round the tongue of the reef, clewing all up, and anchor in 22 fathoms. Then warp to northward up the pool to any depth, from 20 to 7 fathoms, which it is best to do evening or morning when the wind drops.

"At the *Larne's* anchorage we found the lat. $6^{\circ} 48' N.$, and long. $158^{\circ} 26'$ East; variation, $9^{\circ} 45' E.$; high water (full and change), 6^h ; rise and fall, $4\frac{1}{2}$ feet."

This anchorage was surveyed by Lieutenant G. S. Reynolds and Mr. R. Edwards (mate), of H.M.S. *Larne*. It is a perfect pool, with strong clay holding ground. To the northward a fine stream of fresh water discharges itself, which can only be entered by boats an hour before and after high water, with just sufficient breadth to ply the oars. The best place for filling is about half a mile up the stream, near a hut where the natives make nets and repair canoes. Just above this spot the clear fresh water descends in a torrent.

Another port is on the North side of the island. Captain Lütke says:—"Before the N.W. point of the island, remarkable for the high basaltic rock, we saw a large opening in the reef, and beyond that an extent of water which promised a good harbour. I determined once more to find a convenient anchorage. Our boats found a passage $2\frac{1}{2}$ cables length in width, and 25 fathoms in depth, and beyond that, to all appearance, an extensive and safe harbour. But hardly had they passed the entrance channel before they were met by canoes full of natives, who surrounded them in an instant in a most turbulent manner. Rather than come to extremities with them, the boats returned to the corvette. It is possible that these natives had no hostile intentions, but their conduct was such that the search was given over." This harbour was called *Unwelcome Harbour* (Port du Mauvais Accueil) by Captain Lütke, from his reception by the inhabitants.

Lod Harbour, another small harbour—much used by whalers, on account of being able to sail in and out with the prevailing N.E. wind—is on the E. side of the island. The entrance is through a break in the reef, and the anchorage between that and the mangroves which front the shore.

There is another harbour at the N.W. part of the island, in front of the high perpendicular cliff which terminates the island of Jecoits or Joquoits

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to the N.W. The entrance is through an opening in the barrier, about two cables wide, but the water inside is very deep, from 25 to 30 fathoms. Captain Moore says that Jecoits harbour is difficult and unsafe to attempt, and in this he was confirmed by examining it in a boat.

Metalanien Harbour is on the N.E. of the island. The anchorage at Metalanien harbour is perfectly safe, and sheltered from all winds. This harbour has a wide entrance on the North side of the Island of *Naa*, and the only hidden danger to be avoided when running in is a sunken rock, some distance within the entrance, and which lies nearly in mid-channel. The sea sometimes breaks on it; but it can always be avoided by keeping the star-board side of the channel close aboard. The barrier reef at this place extends a long distance from the main land, and between which are many coral flats, with deep-water channels amongst them in some places. The harbour is formed by the main land, and is similar in shape to a horse-shoe, and the channel through the reefs which leads to it runs nearly in a direct line from the entrance in the barrier reef to the heads of the harbour.

This harbour may be easily known to vessels standing in from sea, by a remarkable peaked hill, resembling a spire or sugar-loaf, which is situated on the North shore within the harbour. The channel leading to this harbour lies in a S.W. and N.E. direction. An abundant supply of firewood and excellent fresh water can always be obtained at this place.

Strong N.E. winds prevail from December to April, with much hazy weather and frequent squalls, attended with rain. During these months strong westerly currents are very frequently experienced. From March to August the winds are generally light and variable, but chiefly from the eastward, with much fine weather.

In September, October, and November, strong westerly winds, with severe squalls and rain, may be expected; and strong easterly currents are frequently found during these months. On the whole, the climate must be considered very moist, as scarcely a day passes without rain, especially in the winter months. These continual showers produce rapid vegetation, and keep up a constant run of fresh water from the mountains in the chasms and rivulets between the hills.

The officers of H.M.S. *Larne* make the following observations on this harbour:—It is highly advisable that no square-rigged vessels of any magnitude should enter this harbour. The passage is narrow, with two rocks in it at different angles, and as it fronts directly to the N.E., from whence the trade-wind is perpetually blowing, a heavy swell rolls in incessantly, and their being no soundings *without* the reef, it is dangerous in beating out in case of the wind dropping, and boats are useless for towing on account of the heavy swell. It was entirely owing to these circumstances that the *Falcon*, of London (whaler), was wrecked in her attempt to beat out in July, 1836, after having been three months wind-bound inside.

The *Ant* or *Andema* Group is the second cluster attached to the Ponapi or S niavine Islands. They lie to the S.W. of Ponapi, and their nearest points are about 7 miles distant from each other. This is the same group that was said to be discovered by Captain Fraser, of the ship *Planter*, in 1832, and named by him *William the Fourth Group*, and in some charts, *Fraser Islands*. But the discovery in the *S niavine* being prior to this, of course the credit is due to Captain L tke. When first approaching it, Jan. 5, 1828, he was nearly being drifted on to them by a calm which overtook him; this was caused by the high land of Ponapi interrupting the trade-wind, but did not prevent the heavy swell from rolling onwards. This incident may serve as a caution. He says that the group is composed of a dozen coral islands of different sizes, covered with a thick verdure. There was no appearance of habitation, but they were visited at times, for they saw in one part a pile of stones raised on a large blackish rock. The reef is of a triangular form, and is about 8 miles long on each side, the islands occupying that facing the S.E. The South extreme is in lat. $6^{\circ} 43' 10''$ N., long. $158^{\circ} 5' 30''$ E.

Captain Cheyne, of the *Naiaid*, calls them *Ant Islands*, and says they form a group of four large, low, coral islands, covered with cocoa-nut and bread-fruit trees, and surrounded by a coral reef, forming a lagoon inside, with a passage leading in to it, between the two large islands on the East side of the group.

These islands belong to the chiefs near Kiti harbour. They have no permanent inhabitants, but are resorted to from May till September, for the hawks-bill turtle fishery. They are also visited at other times for supplies of cocoa-nut and bread-fruit.

The *Pakin* or *Peguenema* Group is the third and westernmost of the S niavine Islands. It is composed of five small islands lying in a N.W. and S.E. direction, and extending about 5 miles in length. The S.E. island is named *Katelina*, and its East point is in lat. $7^{\circ} 2'$ N., long. $158^{\circ} 0' 30''$ E. The next lies $1\frac{1}{2}$ miles to the northward of it, and is called *Ta*; the next is *Tagaik*, lat. $7^{\circ} 4' 4''$ N., long. $157^{\circ} 58'$. *Kapenoar* or *Kapenuare* is the westernmost. Its West point is in lat. $7^{\circ} 4' 40''$, long. $157^{\circ} 56' 30''$ E. This is the largest island. In the Nautical magazine they are called *Pakeen*, and the following is the account of the group:—

It is composed of five small islands surrounded by a coral reef, forming a lagoon inside, into which there is no passage through the reef. The westernmost island is inhabited by a Ponapi chief, his family and servants, in all about thirty souls; and this chief claims sovereignty over the whole of this group. The islands are very low, of coral formation, and produce abundance of cocoa-nuts and bread-fruit, and the lagoon plenty of excellent fish to supply the wants of the inhabitants, about 50 in number. The group is about

5 miles in length from East to West, and about 3 miles in breadth from North to South.

This place is celebrated for its canoe sails, which are manufactured from the leaves of the pandanus tree, and which are eagerly sought after by the natives of Ponapi. Poultry are also plentiful in this group. In fine weather the natives frequently visit Ponapi in their canoes, for the purpose of obtaining tobacco and other foreign commodities (Nov., 1848).

NGATIK (Ngaryk) or *Valientes Islands*, a small group of eight coral islands, the East extreme of which is in lat. $5^{\circ} 47' 30''$, long. $157^{\circ} 32'$ East. They were discovered in 1773 by the Spanish navigator, Don Felipe Tompson who called them *Los Valientes*. He made a plan of them, which was found by Captain Lütke to be tolerably accurate, but $1^{\circ} 4'$ too far East. They were seen, in 1793, by Captain Musgrave, in the *Sugar-cane*, who called them the *Seven Islands*; and in the year following they were passed by the *Britannia*, and named the *Raven Islands*. Captain Don Joachim Lafita saw them, and determined their position in 1802. They were surveyed, in 1828, by Captain Lütke, whose account follows:—

The Ngatik or *Ngaryk* group is of a triangular form, and is 22 miles in circumference. We counted eight islands, and not seven as is marked on Tompson's plan. We found a continuous reef surrounding the whole of the group, without having the least passage into the lagoon. It would be curious to know if Tompson was mistaken in marking an opening on the S. side by which the natives passed in their canoes, or whether this opening has become closed in the course of fifty-five years by the zoophyte architects. On all the islands a large quantity of cocoa-nut trees grow. The South side of the northernmost island is quite covered with a forest of these trees. Notwithstanding this, we saw no traces of inhabitants except on the small island at the western angle. Tompson saw people on the eastern islet, and canoes in the lagoon. We were surprised at the entire absence of the latter. This was more strange, as a large quantity of bread-fruit trees, from which they make their canoes, were seen; and besides this, a large quantity of drift-wood lay on the shore. The population must be very slight. It was supposed that the thirty men seen together on the westernmost island formed the entire population.

NUKUOR (Nougouore) or *Monteverde Islands*.—This group, which lies considerably to the South of the general line of the Caroline Archipelago, was discovered by Don Juan Bapt. Monteverde, commanding the Spanish frigate *La Pala*. The first or native name is that applied to them by Captain Lütke, though he did not see them.

They were seen by Captain R. L. Hunter, December 10th, 1840. He made the centre in lat. $3^{\circ} 52' N.$, long. $154^{\circ} 56' E.$ They form a group of small, low, coral islands, covered with cocoa-nut and other trees, and con-

ected by a reef, forming a lagoon inside. The whole group is only about 12 or 14 miles in circumference. They are well inhabited, by a fine, handsome race, who are above the mean stature, and resemble the natives of the Navigator Islands in appearance. Their canoes are neat, and capable of carrying 12 men.

GREENWICH or Constantin Island.—This isolated spot was seen in 1825, and then had the first name applied to it. It was again reported in the Nautical Magazine, 1852, page 226, and was considered as doubtful. It was then seen on December 20th, 1853, by the late Captain Tardy de Montravel, of the French Marine, who has done great services to hydrographical science, when proceeding in the French ship *Constantin*, to New Caledonia. He saw a group of low islets, to which he gave the name of his ship. The group is composed of a dozen low islets covered with stunted cocoa-nut trees, which would not be visible beyond 10 miles. They are encircled by a reef which from the mast-head appeared to enclose a lagoon. The urgency of the voyage prevented any close examination, or its being ascertained whether there were any inhabitants. The position of the northernmost islet was determined astronomically to be in lat. $1^{\circ} 4' N.$, long. $154^{\circ} 47' 55'' E.$

They were again seen by Captain W. Symington, in the *Northfleet*, in 1864. He says: It is of the usual form of a coral lagoon in its earliest stage, only one-third of it being above water, and consisting of twenty-six small islets, a few feet above water, and covered with cocoa-nut trees. Reefs extend in a W.N.W. direction from the extreme N.W. islet to a distance of 5 miles. It was not inhabited. It was also seen in the Spanish frigate *Berenguela*, in 1865, as in $1^{\circ} 3' N.$, $154^{\circ} 54' 50'' E.$

From a mean of the positions stated it may be placed in lat. $1^{\circ} 3' N.$, long. $154^{\circ} 41' E.$

Decapolis Reef, seen by the vessel of that name, in May, 1869, at half a mile distance, in lat. $0^{\circ} 32' N.$, long. about $152^{\circ} 51' E.$ It seemed to be of small extent, and the sea, although smooth at the time, broke occasionally over it.

ORALUK, *San Agustino*, or *Bordelaise Island* and reef, a small, low, coral island, 2 miles long and about 60 feet high, with a reef projecting from it to the S.E. for 15 miles, was perhaps discovered, in 1826, by Captain Saliz, commanding *Le Péruvien* of Bordeaux. The reef forms a lagoon inside it, and from its S.E. part the island cannot be seen. The island is in about lat. $7^{\circ} 39' N.$, long. $155^{\circ} 5' E.$

Several discoveries have been stated to be made in this immediate neighbourhood. *Jane Island*, by Capt. Johnson, of the ship *Guilford*, in October, 1827, in lat. $7^{\circ} 33' N.$, long. $155^{\circ} 3'$. His description, which accords very nearly with that of Capt. Saliz, is that of a small low island, half a mile in

North Pacific.

length, with a very dangerous reef running off the S.E. extreme of the island to the distance of 5 miles, and a chain of rocks extending to the E.S.E., as far as could be seen from the mast-head. Captain Polack, of the ship *Esmeralda*, says (1862), that the island cannot be seen from the S.E. point of the reef. It is therefore very dangerous.

The *Isabella Reef*, so called from the wreck of a whaler of that name, was said in the usual vague manner to be 80 miles long, and in lat. $7^{\circ} 21' N.$, long. $156^{\circ} 30' E.$ This is very far to the eastward, and therefore must be viewed with distrust. Still it shows that the neighbourhood requires examination. The following will still further demonstrate this.

Another is *Larkins Reef*, or *Campbell Reef*, a dangerous reef discovered by Captain W. Campbell of the ship *Larkins*, February 23, 1830. The N.E. point is placed in lat. $7^{\circ} 36' N.$, long. $155^{\circ} 10' E.$ He did not see the small island, but says it is 14 miles E.S.E. of Bordelaise Island. Meaburn Island, on Norie's chart, in lat. $7^{\circ} 49'$, long. $155^{\circ} 20'$, must be the same. San Agustino Island and *Baxo Trista*, discovered by Don F. Tompson, which, though placed by him 2° to the East, would appear to be the same; more particularly, as, should the position have been correct, he would have been within sight of the high S niavine Islands. L tke discovered an error of $1^{\circ} 4'$ in the longitude of Los Valientes, which would reduce the discrepancies to 1° , which Admiral Krusenstern considers ought not to be considered as decisive. Although his opinion is that all these are identical, still San Agustino Island may be placed as doubtful.

Bordelaise Island, therefore, it is very probable, is the only island. It is covered with bushes and palm-trees, and can only be seen 10 or 12 miles. A M. Edw. du Pernet, master of an Oahu schooner, was wrecked on its reef in 1843, and remained on the islet five months, during which time they built a small craft which carried them safe to Guam. He was pretty certain that no other island existed near it. The island is uninhabited, but we cannot be certain of its character, or of the authenticity of the various announcements, till a further examination is made.

Wishart Reef, *Minto Breakers*, or *Costello Reef*.—On January 3rd, 1842, Captain J. R. Wishart, in the barque *Countess of Minto*, saw a patch of breakers, dry in some places, more particularly in the North part, extending in a N.W. and S.E. direction. He made it in lat. $8^{\circ} 10' N.$, long. $154^{\circ} 19'$ corrected. It was again seen by Captain Agostinho Costello in the Sardinian schooner *Sofia*, Nov. 27, 1854. A wreck, with only the bowsprit and jib-boom, was lying on the East part. It was described as of an elliptical form, 7 miles long East and West, and 2 miles broad North and South. Except the small portion at the point where the ship lay, it was awash, or some feet under water, when the sea breaks all over it. Lat. stated $8^{\circ} 6' N.$, long. $154^{\circ} 0' E.$ It was again seen by Captain Richards, in the Siamese ship *Ocean Queen*, July 25, 1855, the same wreck still lying on it. The position

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of the latter was lat. 8° 6' N., long. 154° 20' 30" E. It was again seen by Captain Webb, in the ship *Mildman*, in 1858. He saw two wrecks on it, and places the West end of it in lat. 8° 8' N., long. 154° 29' E.

From an announcement in the *San Francisco Herald*, a reef, 10 miles long, lies in lat. 7° 56' N., long. 154° 20' E. All these announcements evidently refer to the same reef, and are tolerably accordant. The mean of the five positions, supposing them to refer to the South end, as they appear to do, would place it in *about* lat. 8° 5' N., long. 154° 17' E.

Dunkin Reef, seen by the person whose name it bears in 1824, is marked as an extensive shoal, the South end of which is in lat. 8° 50' N., long. 154° 10' E. It is possible that it may be the same as Wishart Reef, but as another announcement, by a whaler, places it nearly in the above latitude, or 9° 0' N., 55 miles northward of the mean latitude of the former, it must be considered for the present as a separate danger, of unknown extent and character, but in *about* lat. 8° 55' N., long. 154° 5' E.

LOSAP (Louasappe), or *D'Urville Island*.—This is a small island discovered and named by Captain Duperrey, in lat. 7° 3' 40" N., long. 152° 42' 20" E. In the second volume of Admiral Krusenstern's *Memoir* (p. 347) it is called *Duperrey Island*, but this was before the publication of that commander's voyage. They are called the *Westervelts Islands* by the apocryphal Captain Morrell, who believed them to be a new discovery, February 23, 1830. He says they seem to be composed of three small low islands, of nearly equal size, connected by a coral reef. They are well wooded with cocoa-nut and bread-fruit trees. They were neither of them more than 5 miles in circumference, and had biche-de-mar and pearl-oysters on the reefs. Population 200.*

MORTLOCK ISLES were discovered November 29, 1793, by Capt. James Mortlock, commanding the ship *Young William*. Admiral Krusenstern applied the name of the discoverer to them, while on other charts the name of his vessel is given. Mortlock only saw their South side, and consequently gained a very imperfect notion of them. This is obviated by the examination made by Captain Lütke. He surveyed the group, and they are considered as separate islands in Dr. Gulick's list, consisting of *Lukunor*, *Sotoan*, and *Etal*.

Captain Cheyne says that these islands are well inhabited by an able-bodied race, of a light complexion. Strangers should be very cautious in holding intercourse with them, as they are *not to be trusted*, no matter how

* **SAN RAFAEL ISLAND** of Captain Monteverde, 1806, and so named by Duperrey, is placed in 7° 18' N., long. 163° 54' E., or 72 miles to the eastward of Losap or D'Urville Island. It is not enumerated in Dr. Gulick's list, and therefore there is some doubt as to its existence. If not, it is possibly the same as the latter island, as the descriptions in some degree coincide.

friendly they may appear. Under no consideration should any of them be allowed on deck.

The following are Lütke's descriptions of them:—Between the lat. of $5^{\circ} 17'$ and $5^{\circ} 37'$ N., long. $153^{\circ} 59'$ and $153^{\circ} 37'$ E., are three low coral groups, on which may be reckoned ninety islets of various dimensions.

LUKUNOR (*Lougounor*, Lütke—*Lugunor*, Cheyne), the easternmost of these groups, is of an oval form, and 18 miles in circuit. *Lukunor Island*, at the eastern angle of this group, is curved into the form of a horse-shoe, and forms an excellent port, which was named *Chamisso*, in honour of the naturalist who gave to the world the first notions worthy of credit on this archipelago. The breadth of the island is from half a verst (one-third of a mile) to 150 paces. Its middle, raised about 7 feet above the water level, is covered with bread-fruit trees, and on the shores particularly, cocoa-nut and other trees, the fruit on the top of which frequently hangs down to the water of the interior lagoon. The southern part of the island is sandy, but towards the North there is much vegetable mould, on which are distributed the arum plantations, which require a very humid soil, and near to which are all the habitations of the natives. These plantations are intersected by narrow channels, which conduct the water to irrigate all parts, and serve as boundary marks. The woods which surround them form a magnificent panorama, where plants of every species are in infinite variety, giving the most excellent idea of the productions of these low islands.

The island naturally has no fresh water, but the rain water is collected in trenches and in a sort of reservoir, which the natives excavate in the trunks of those cocoa-nut trees that were inclined. The water in the trenches was always found to be brackish, and smelt bad. This slight resource suffices for the inhabitants, inasmuch as they drink but little, and the cocoa-nut supplies the deficiencies by its delicious contents.

The Lukunorians were found by Captain Lütke to be hospitable, kind, reserved, and of agreeable manners. They are above the middle size; they had apparently had some communication with shipping previously, either by report or otherwise. Their canoes, in which they pass a considerable portion of their lives, are constructed with infinite pains, and are very carefully preserved, the larger ones on shore; and in their management they show great skill and judgment in the very long voyages which they undertake by these means. These islanders are the easternmost of the Caroline natives who thus travel.

Lukunor offers no more resources than any other of the low coral islands. The supply of fresh water depends on the abundance or scarcity of the rains. There is no wood. A good supply of cocoa-nuts may be looked for; bread-fruit can only be had in the season. Some poultry and pigeons were also procured. Port Chamisso is in lat. $5^{\circ} 29' 20''$ N., long. $153^{\circ} 58'$ E. Captain Cheyne places it 8 miles further West. The population is about 200.

The **SOTOAN GROUP** lies to the S.W. of Lukunor. It is 17 miles in length from N.W. to S.E., and 12 miles broad. About sixty islets were counted on it. In two places openings in the reef were observed, by means of which, doubtless, an entrance into the lagoon might be effected. All the islets are covered with wood, but it appeared to be less populous than Lukunor. Only two or three canoes approached the *Séniavine*, but no communication was held with them.

Capt. Cheyne in the *Naiad* visited the islands in Oct. 1844. He found a good passage through the reef, on the S.W. part of the group, and anchorage in the lagoon, near the entrance, but the bottom was very uneven and rocky. The *Naiad* anchored in 25 fathoms, about three-quarters of a mile to the northward of the entrance, inside of a small islet bearing S.W. from her one-quarter of a mile, and lay there three weeks, during which time they built a biche-de-mar house on the small island, but could not get the natives to collect the slug, and consequently were obliged to leave. The present population is about 500.

Captain Cheyne places the N.W. extreme in lat. $5^{\circ} 27' N.$, long. $153^{\circ} 27'$ East, and the South extreme in $5^{\circ} 16' N.$, $153^{\circ} 40' E.$

The **ETAL GROUP** is the third and northernmost of the Mortlock Isles; it is a small group, not more than 12 miles in circumference, and composed of several low coral islands and islets, thickly wooded, connected by a reef, forming a lagoon inside. The channel between it and Sotoan is about 5 miles wide, and clear of danger. The centre of the group is in lat. $5^{\circ} 38' N.$, long. $153^{\circ} 24' E.$ (Cheyne). Population 200.

The **NAMOLUK ISLANDS** lie 35 miles to the N.W. of Lukunor. In coming from the North the *Séniavine* passed them, at the distance of less than 12 miles, which shows how readily these islands may be unnoticed even within such a distance. They were also probably seen by Captain Harwood, in the ship *Hastings*. They are most likely the same as the *Hashmy Islands* (called by Dr. Gulick *Mokor*), announced as being very populous in the Sydney Herald, March 25, 1833. Captain Cheyne of the *Naiad* says they are five in number, the group 15 miles in circumference, of a circular form, 100 feet high (to the top of the trees?), and well wooded with cocoa-nut, bread-fruit, and other trees. The reef may be approached within 200 yards, as no hidden dangers exist. The natives, he says, though wearing the mask of friendship, are by no means to be trusted. Population 300.

Captain Lütke, the real discoverer, places the N.W. isle in lat. $5^{\circ} 55' N.$, long. $153^{\circ} 13\frac{1}{2}' E.$

TRUK or *Hogoleu Islands*.—This group is composed of four or five large and lofty basaltic islands, surrounded by a barrier reef, on which are a great number of coral islands. It is one of the most extensive in the Caroline Archipelago, and was discovered by Captain Duperrey, June 24, 1824. His

survey, published on a large scale in the atlas of his voyage, comprises almost the sum of our knowledge of them, as the relation of his voyage, as far as concerns this part of the Pacific, has not been published. According to the chart, the northernmost of the group, *Pise Island*, is in lat. $7^{\circ} 42' 30''$, long. $151^{\circ} 49' 15''$; the southernmost, *Givry Island*, in lat. $7^{\circ} 9'$, long. $151^{\circ} 51' 45''$; *Torres Island*, the westernmost, in lat. $7^{\circ} 20'$, long. $151^{\circ} 28'$; and the easternmost, in lat. $7^{\circ} 33'$, long. $151^{\circ} 59'$. The largest of them, *Tol*, is not more than 10 miles in circumference. It is of very irregular form, and on each of its projections is a hill, that to the S.E. being 700 feet high. At 12 miles to the East of it is *Ruk*, 4 miles long and 700 feet high.

This Islet is in lat. $7^{\circ} 18' N.$, long. $151^{\circ} 49' E.$ (Cheyne), is three-quarters of a mile in extent, covered with cocoa-nut trees and other wood. It has anchorage to the N.W. of it, and plenty of fresh water can be procured on the North side.

The *Royalist Islands* of Captain Cheyne are probably the S.E. extreme of Hogoleu. He passed 7 or 8 miles to the eastward of them in October, 1844, and thought them a distinct group, as no part of the larger islands was visible. They are low, of coral, covered with wood, and enclosing a lagoon. They were thickly peopled by a vigorous race. Lat. $6^{\circ} 47' N.$, long. $152^{\circ} 8' E.$

Capt. Morrell gives a glowing picture of the people, but unfortunately it is not correct. Capt. Cheyne, in the brig *Naiad* and *Will-o'-the-Wisp*, came here in Oct., 1844, to collect biche-de-mar, and were completely taken off their guard by the apparent friendliness of the natives, who at first assisted them to build their curing houses. As soon as the brig left, they attacked the schooner with a force of 2,000 men, and were only repulsed with desperate fighting, and the loss of six killed and five wounded. They also seized the long-boat, which was recovered the same day, and a severe drubbing administered. They had a great number of large Spanish knives, and were armed with brass-hilted cutlasses. The population, according to Dr. Gulick, is 5,000.

Hall Island.—In the relation of the voyages of Captain Saliz, in the French ship *Le Péruvien*, 1825-27, it is stated that this group was discovered by an English commander named Hall, in 1824, and that it consisted of two groups, separated by a channel, which was named after his vessel, *Lady Blackwood Passage*.

Captain Lütke examined them in detail, and describes them in his narrative.

The **MOURILEU GROUP**, which lies to the N.E., is composed of nine islands, the principal of which are *Mourileu*, *Rud*, and *Namourousse*. The reef which surrounds them is of an irregular form. On the leeward side it is for the most part submerged, and cannot be distinguished but by the greenness of the water. Should a vessel strike on this by night, there can

be but very little hope for safety. On the South coast of Ruá there is a passage, even for large ships, which renders it probable that anchorage would be found in the lagoon. The inhabitants only occupy the windward islands, and do not go to the S.W. angle of the group, except for the purposes of fishing.

The easternmost islet, Mourileu, is in lat. $8^{\circ} 47' N.$, long. $152^{\circ} 20'$ East. Population 100.

NAMOLIPIAFANE or *Fananou* of Lütke, is 40 miles in circumference, and encloses thirteen islands, the principal of which are *Ikop*, *Fananou*, and *Namouine*. These islands, as well as those which compose the Mourileu group, are very small, the largest not being more than two-thirds of a mile long. The rest of the space is occupied by the reef, which is not less dangerous here than that of Mourileu. The entrance to the lagoon is on the South side.

Captain Lütke took off a sailor, William Floyd, who had been left here by a whale ship, and from whom he gathered some particulars of the archipelago.

Namouine, or Namouyne, the southernmost, is in lat. $8^{\circ} 30' N.$, long. $151^{\circ} 42\frac{1}{2}' E.$ Population 50.

EAST FAIU or *Lutke Island*.* This little island possesses a name which was repeated in another to the westward; hence its prefix by Captain Lütke. Krusenstern proposes the name of *Lutke Island* on this account. It is but a small islet, not more than a mile long, and about three-quarters of a mile broad. The Caroline Islanders sometimes touch at this island in their passages to procure fresh water, which is deposited by the rain in a small basin on it. It is in lat. $8^{\circ} 33' 20'' N.$, long. $151^{\circ} 26' E.$ Population 50.

NAMONUITO ISLAND.—The S.W. isle of this group was seen by Capt. Ibargoitia, in the *Philippine*, in 1801. He called it *Anonima*, because it did not appear on the charts. It was named by Morrell *Livingston Island*, in 1832. In Captain Duperrey's chart it is called *Bunkey's Island*, from the name of a commander who crossed the group (so it is stated) in 1824.

The Namonuito group, according to Captain Lütke's observations, lies between lat. $8^{\circ} 33'$ and $9^{\circ} 0' N.$, and long. $150^{\circ} 31'$ and $149^{\circ} 47' E.$ Whether as the commencement or the base of a group of islands, or else of a single island, which some day will exist here, this place merits particular attention. It presents all the aspect of the coral formation from its origin. Either from its later formation or its greater extent, it remains behindhand of the rest of the group, and does not yet form but the elements of a group. Here is the bed of the future coral dike, having a depth equal to 20 fathoms, and bestrewed with banks of little depth. At the windward limit of this dike there

* It may be observed that Admiral Krusenstern has applied the name of *Lutke* to the large group to the West, next described in his atlas. This is probably an oversight.

are already some islets united together by a reef, but is not yet continuous; on the opposite side there is also an island. The reefs extend from the two extremities for a short distance along the dike, the space between it and the reefs being occupied by submerged banks, which are still separated by large intervals. It would be interesting to follow the progress of this incipient coral group, which may take thousands of years to completely form, and would then be one of the largest, being 85 miles from East to West.

The south-easternmost of the windward group is *Pisarr*, or *Isorarr* (or *Pizaras* of M. Chamisso), and is in lat. $8^{\circ} 34' 20''$ N., long. $150^{\circ} 32' 30''$ E. Beyond this, on the N.E. face, are *Ounalik*, *Amytideu*, *Pilipal*, and *Onooup*; and N.W. of these again are two other islets, *Maghyr* and *Maghyrarik*. These three groups are united to each other by a reef, on which the sea breaks in some parts; in others only marked by the greenish colour of the water.

The south-westernmost island, *Ulul* or *Onooun*, the Anonima of Ibargotia, is in lat. $8^{\circ} 36'$ N., long. $149^{\circ} 47' 30''$ E. Between it and *Maghyr*, the reef consists of a series of submerged shoals. Capt. Lütke did not land on these islands, but was visited by numerous canoes. Present population 50.

The **Mannaijeu or Gray Feather Bank**, which was stated by Chamisso to be found by Don Luis Torres in lat. $8^{\circ} 20'$ N., long. 149° , and had 21 fathoms water on it, was unsuccessfully sought for by Capt. Lütke in this position. He sailed on this parallel as far as long. 148° without finding bottom with 50 fathoms of line. The determination of the position of this bank is important, as it may be an island or reef in course of formation. It is said that the discoverer sailed for three entire days on it.

This bank, probably, was again seen by Captain McLaughlin of the ship *Gray Feather*, who fell in with discoloured water in 1851, and sounded in $19\frac{1}{2}$ fathoms, coral bottom. From aloft the reef could be distinguished as of a circular form, $2\frac{1}{2}$ miles in circumference. Lat. $8^{\circ} 9'$ North, long. $148^{\circ} 44'$ East. (*Ann. Hyd.* VII. p. 18.) This is 11 miles South of the older announcement, but it is perhaps not too great a discrepancy.

TAMATAM or *Los Martires Island* was seen by Duperrey, who places *Tamatam*, the southernmost, in lat. $7^{\circ} 34'$ N., long. $149^{\circ} 29'$ E. They are three in number, all small and low, with dangerous reefs jutting out from them in all directions. *Fanadik*, the middle island, is $1\frac{1}{4}$ miles N.W. from *Tamatam*, and is not more than a quarter of a mile in diameter, but is surrounded by a reef. *Olap*, the northernmost, is $3\frac{1}{4}$ miles N.N.E. from *Fanadik*. It is the largest of the group, and, like the others, surrounded by dangerous reefs. They are thinly populated, and appear to be very lightly wooded. The largest and most abundant are the cocoa-nut trees; but the inhabitants are badly supplied with fruits. There is but little inducement to visit these islands, the less so on account of the reefs and dangers, the

strong currents which set between them, and also from the hostile and treacherous character of the natives. Population 200.*

POLOAT, or *Enderby Islands*, a name given to a group by Capt. Renneck, in 1826, in the service of the well-known noble merchants of London. In 1799, Captain Ibargoitia discovered an island, which he called *Kata Island*; but Freycinet decided that it was in reality two islands, one of which is called *Poulouhot* (*Poloot*), and the other *Alet*, which is in lat. $7^{\circ} 19' 25''$ N., long. $149^{\circ} 17'$ E. Population 100.

Enderby Bank, a coral reef with 7 fathoms water, lies 7 miles West of Alet, and the *Uranie Bank* lies 6 miles eastward of Poloot; it has 22 fathoms.

SUK (*Poulousouk*, *Sooughe*), or *Ibargoitia Island*, was seen by Captain Ibargoitia in 1799 and 1801. It was named *Poulousouk* (*Pulo Suk*) by Capt. Freycinet, and was taken by Ibargoitia, though with no probability, for the *San Bartolomé* of Quiros, in 1597. Its position is about lat. $6^{\circ} 40'$, long. $149^{\circ} 8'$ E. Captain Cheyne places it in lat. $6^{\circ} 35'$, long. $148^{\circ} 22'$. It is of coral formation, covered with cocoa-nut trees, and similar in size and appearance to Poulouhot. It is inhabited by a light-complexioned race, 100 in number. It is called *Sooughe* on Lütke's chart. At 5 leagues to the East of it is a bank seen by the vessel *La Paz*, in 1819.

Captain Cheyne says:—I was told by the master of a whaler some years ago, that a coral bank, with irregular soundings of from 10 to 30 fathoms, extends from this island to the N.W., for a considerable distance, and terminates in a dangerous reef. The only idea he could give of the distance, was, that when abreast of the reef, the trees on Pulo-souk were just visible from the topsail yard. This danger requires confirmation; but ships passing should be on their guard, and keep a good look-out.

Irons Shoal.—A coral shoal was sailed over by Captain D. Irons, of the *Lady Elgin*. The spot struck in 10 fathoms was in lat. $6^{\circ} 18'$ N., long. $149^{\circ} 28' 30''$ E. from which a depth of $7\frac{1}{2}$ fathoms was carried for about $1\frac{1}{2}$ mile to S.S.W. and then to N.N.W., when broken water was seen to North and clear water to West. (*Naut. Mag.* 1855, p. 278.) It may be the same as the *La Paz Bank* of 1819, which is placed at 25 miles to the northward.

* **BLACKLOCK SHOAL.**—Captain Blacklock, of the ship *Cosciumulzie*, in 1861, reported a shoal at 20 miles E. by N. $\frac{1}{4}$ N. from the Martires, in lat. $70^{\circ} 35'$ N., long. $149^{\circ} 36'$ E. He saw the bottom quite distinctly under the ship, and all around her, with casts of 7 fathoms on one side of the ship, and 15 fathoms on the other; he believed the water was much shoaler in some places, as some of the coral heads appeared to him close to the surface. He sailed for 3 miles on an East course, carrying soundings of from 7 to 15 fathoms, then suddenly 30, and no bottom at 100 fathoms. If the position of this shoal is correct, the Martires must be considerably too far to the eastward on the charts, and it should be observed, that it would be impossible to see them at the distance reported by Captain Blacklock.

PIKELOT or *Coquille Islet*.—This small islet was seen July 3, 1824, by Captain Duperrey, in lat. $8^{\circ} 12' N.$, long. $147^{\circ} 41' 30'' E.$ It was named after Duperrey's vessel by Krusenstern; the discoverer named it *Bigali*; Lütke writes it *Pigali*, or *Pyghella*. Don Luis Torres, who saw it and the adjacent island, names them *Pigouelao* and *Faliao*. It is more than 300 yards in diameter, and nearly level with the water's edge, and surrounded by a reef. It is covered with a thick undergrowth of bushes, and about fifty cocoa-nut trees. It is uninhabited.

WEST FAIU ISLET, which lies in lat. $8^{\circ} 7\frac{1}{2}' N.$, long. $146^{\circ} 47' 30'' E.$, that is, 55 miles exactly West of Pikelot, is a similar islet to it, both in size and character; the reef forms a small bay on it. There is a high wood on it, among which bread-fruit trees were seen, but not a single cocoa-nut tree. It is also uninhabited. There is another island of the same name to the eastward, before alluded to, which has been named Lütke Island for distinction.

The *Oraitilipou Bank*, seen by Don Luis Torres, lies somewhere between these two islets. It had but 11 fathoms over it, but was not found by Lütke, after a careful search.

Pikela or *Lydia Island* is marked on Captain Duperrey's chart in lat. $8^{\circ} 38'$, long. $147^{\circ} 10'$. Its existence may be considered as doubtful, but it is mentioned in Dr. Gulick's list.

SATAWAL (Setuahal) or *Tucker Island*, was seen by Captain Wilson, in the missionary ship *Duff*, October 25, 1793. Duperrey places it in lat. $7^{\circ} 22' N.$, long. $147^{\circ} 6' E.$ The island is not more than 2 or 3 miles in circumference, and the articles of subsistence it produces are supposed to be only fish, roots, cocoa-nuts, and, perhaps, bread-fruit. When the *Duff* approached, some canoes of natives (not a stout race) came off, and two men, Tucker and Connelly, deserted here. Captain Cheyne (1846) says that it may be approached within one-quarter of a mile, as no hidden danger exists; that it is of coral formation, covered with cocoa-nut trees. It has about 200 inhabitants.

Swede Islands.—These islands consist of three separate groups, that to the East being named *Lamotrek* (Namurrek or Namouttek); the westernmost, *Elato*; and the southernmost, *Olimarao* or *Namoliaour*. They are most likely the islands named *Swede* and *Haweis* Islands by Captain Wilson, of the *Duff*, 1793, the first on account of a Swedish sailor of his, who was landed at his own request on one of them. They were examined by Lütke.

LAMOTREK (of Dr. Gulick), an atoll of a triangular form, is 6 miles in extent E.S.E. and W.N.W. Several islets stand on the reef, which encloses the lagoon, the S.E. of which is in $7^{\circ} 32' N.$, long. $146^{\circ} 30' E.$ Population 200.

ELATO or *Haweis* is nearly on the same parallel as Lamotrek, in lat. $7^{\circ} 30' N.$, long. $146^{\circ} 15' E.$ This side of the group consists of an uncovered

reef, with some islets, one of which is called *Falipi*. On the chart of Cantova, nearly in this spot, is marked *Bank of Falipi*. Can this bank have become an island in the interval of 100 years? There is a port in the Elato group, and the vessels sent from the Marianas to collect biche-de-mar always stop here. Captain Lutke could not find the entrance to the lagoon, which he was afterwards told was on the eastern side, contrary to the usual law of coral reefs. The natives were very shy, and would not visit his ship. Present population 300.

Ianthe or Nile Shoal.—Two shoals have been announced as existing at 80 and 102 miles respectively distant from Ifalik or Wilson Island, in a S. by E. direction. The first by the ship *Ianthe* in 1846, as in lat. $5^{\circ} 53' N.$, long. $145^{\circ} 39' E.$ (*Naut. Mag.* 1846, page 265, and 1861, page 166): and the second by the barque *Nile*, in 1860, as in lat. $5^{\circ} 31' N.$, long. $145^{\circ} 42' E.$, nearly on the same meridian, but 22 miles apart.

The *Ianthe* passed within one or two ships' lengths of the eastern edge and the shoalest part of a ridge of sharp rocks (apparently not more than 8 or 10 feet under water, the water of a milky whiteness) in soundings of probably 6 or 8 fathoms. The shoal appeared to extend S. by E. and N. by W. about half a mile. The *Ianthe* claims to have obtained on the same day a good meridian altitude, and estimates the nearest land to have been distant 85 miles. The *Nile* passed over a reef, with little room to spare, the rocks being plainly seen on each side of the vessel, and the man aloft reported breakers on one side; the barque was before the wind, and only a few minutes between the rocks. Notwithstanding the great difference in the latitude, the two reports refer probably to one and the same reef.

Should they be but one reef, the mean latitude would be $5^{\circ} 42' N.$, otherwise there may be a continuous reef or series of reefs between the above parallels.

OLIMARAO ISLES, two small islets surrounded by a reef, discovered in 1828 by Capt. Lutke, in lat. $7^{\circ} 43' 30'' N.$, long. $145^{\circ} 56' 45'' E.$ The group is not more than 5 or 6 miles in circuit, and seems to have some timid inhabitants, who asked for food, now about 200 in number.

IFALIK or Wilson Islands.—This is a small group, seen as two isles by Wilson, in the *Duff*, in 1793. They were visited by Lutke, April 3, 1828, and were found to consist not of two, but of four islets; *Ifalik* (or *Evalouk*), *Moai*, *Ella*, and *Fararik*, lying, as usual, on the edges of a lagoon about 5 miles in circumference. This group is more populous in proportion than the others. The *Séniavine* was soon surrounded by twenty-five canoes, containing at least a hundred natives, who were distinguished from all the rest of the Carolinians by their clamorous disposition; he had some little trouble from their stealing propensities. Captain Cheyne says there is a good boat passage through the reef, on the South side of the group. The islets

are covered with cocoa-nut and bread-fruit trees. The N.E. point of the group is in $7^{\circ} 15' N.$, $144^{\circ} 30' E.$ Population 200.

WOLEA or Ulie Islands.—Captain Wilson, in the *Duff*, 1793, discovered a group which he named the *Thirteen Islands*; but when the minute examination was made by Lieut. Zayalichine, Captain Lutke's officer, it was found to consist of 22 islands, the names of which are very well designated on Capt. Freycinet's chart and by M. Chamisso. The name, as given on the chart on a large scale then drawn up, is *Oulleay*, in the narrative *Ouleai*, by Dr. Gulick as above.

From the observations made in the *Semiavine*, the southern point of *Raour*, the easternmost of the group, lies in lat. $7^{\circ} 26' 7'' N.$, long. $143^{\circ} 53' E.$

The charts of this group are a very good example of what exaggeration will do to mislead the navigator. In the old charts this group occupies a space of two or three degrees in longitude. Captain Freycinet reduced it to seventy miles; but when the survey was made by Captain Lutke, it was found not to exceed six nautic miles in extent.

The fatiguing uniformity of the coral islands has at least this advantage, that one description serves for all. But the Wolea group differs from the others in this respect. Its figure is very irregular; it has two projecting angles to the North, and a deep indentation between them. According to the usual hypothesis of formation, this figure cannot be explained but by supposing that two independent groups were formed at the same time in this part. The channel of 12 yards, between the islands of *Angaligarail* and *Farailes*, seems to mark their separation. The reef, which extends thence to the S.E., reunites abreast of *Motogoseu* to the reef running from *Raour* Island, thus completing the eastern group; at the same time a depth of $4\frac{1}{2}$ fathoms, and the reef extending East and N.E. from *Felalis*, marks the direction of the prolonged reef, which would in time reach to *Farailes*, and form the western group.

WOLEA or Ouleai, properly so called, is advantageously distinguished not only from the rest of the group, but from the generality of coral islands. Its southern side has not the shoal which renders landing so difficult elsewhere; but the shore rises with a tolerably steep ascent, presenting an even, clean, sandy bottom, on which every grain of sand may be seen through the transparent water at the depth of several fathoms. The interior of the island is pleasant; it is a wood intersected in all directions by footpaths, and dotted with cleared spots, where you meet with isolated houses. Unlike the generality of coral islands, when you advance only a few steps from one shore, and then reach the opposite, it occupies a large space, on which fine bread-fruit trees have sufficient room to form a sort of park. It occupies the N.E. angle of the group, and is of an irregular triangular form, three-quarters of a mile in diameter. Its North extreme is in lat. $7^{\circ} 22' 6'' N.$, long. $143^{\circ} 57' 53'' E.$

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Palliu Island extends from its S.E. extremity in a nearly true South direction, and is nearly connected with *Raour Island*, the south-easternmost of the group, the two together being 1½ mile in length.

On the western side of *Raour*, off the North part of which the *Seniavine* anchored, are four or five artificial harbours, such as had not been seen in any other part of the Carolines. A jetty of large stones ran out for 100 yards into the sea, and at each side of its extremity another line of stones, projecting at an angle of about 60°, so that the whole has something the form of an anchor. From the South end of *Raour* the reef projects nearly half a mile; and between it and *Tagoilap Island*, 2 miles to the W.N.W., is *Motogozu Islet*, which is very small, and, like all the rest, surrounded by a reef, so that the anchorage in the eastern group has two entrances, one on each side of *Motogozu*.

Felalisse or *Falalis Island*, the S.W. of the group, lies 2 miles to the S.W. of *Tagoilap*. Between it and *Motogozu* there are some detached coral patches. The reef runs to the N.W. three-quarters of a mile from *Felalisse*, leaving a navigable opening into the lagoon between it and *Falulap* or *Faluelap*, a small islet, one of a group which extends N.N.W. and N. 1½ mile to *Oulemeray*, the N.W. island of the group. Thence the chain is continued through *Seliaps* and some smaller islands to E.S.E. to *Farailesse*, between which and *Langaligarails* is the very narrow but navigable channel before alluded to, forming a northern entrance to the lagoon.

Captain Cheyne says: This group is well inhabited by a light copper-complexioned race, who, although friendly in appearance, should not be trusted. Their weapons consist of Spanish knives, spears, clubs, slings, and stones. Their canoes are similar in shape to the proa of the Mariana Islands. They perform voyages to Guam, and the other Caroline Islands in them. Their food consists of cocoa-nuts, bread-fruit, taro, bananas, sugar-cane, and fish. Ships holding intercourse with these natives should not allow any of them on deck. Dr. Gulick says the population is 600.

FORAULEP (*Farroilap* or *Fattoilap*) was in reality first discovered by Lutke, March 28, 1828. Such an island is stated to have been seen by Don L. Torres, but it had been placed at hazard on all charts previous to its position being fixed as lat. 8° 36' N., long. 144° 36' E.* It is a small group, not more than 4 miles in circuit, and composed of three islets, with a lagoon in the middle. The group cannot afford much for resources. Its population was about sixty able men in 1828. It is now uninhabited, according to Dr. Gulick, who calls it *Gardner Island*.

* It is rather singular that Capt. Wilkes should state this island to be in lat. 10° 45' N., long. 146° 27' E., from the charts. The *Flying Fish* consequently passed over this position without seeing any indication of land; the same with *Feis Island*. *Narrative of the United States' Exploring Expedition*, vol. v. p. 271.

GRIMES ISLAND.—From a report in the China Mail, Captain Grimes of the ship *Jean* discovered, in 1841, a high and well-wooded island, of 6 miles in circumference, in lat. $9^{\circ} 16' N.$, long. $145^{\circ} 43' E.$ It was again seen in 1855 by Captain Vice, of the French ship *Chili*, in lat. $9^{\circ} 17' N.$ long. $145^{\circ} 11' E.$; the descriptions entirely agree, and differ quite from Farroilep. It has since been announced as *High Island*, in lat. $9^{\circ} 11' N.$, long. $145^{\circ} 45' E.$, so that the latter position is probably nearly correct. It is not included in Dr. Gulick's list.

EAURIPIK or Eourypyg is a small group, composed of only two islets. Lutke, who passed along its northern side, had no communication with the inhabitants who he saw standing on the beach, consequently could gather no particulars of it. It has a lagoon. Their existence was then established, though on Arrowsmith's chart two islands are placed nearly in the same position, stated to have been seen by Captain Hunter in 1791; there is no notice of this given in his narrative. Their position is lat. $6^{\circ} 40' N.$, long. $143^{\circ} 10' E.$ Captain Cheyne calls them the *Kama Islands*, and were visited by him in September, 1844. The population amounted to about 150; now it is only 50. The islets produce nothing but cocoa-nuts.

SOROL or *Philip Islands*, two small islands, both seen by Captain Hunter in 1791. The easternmost is the largest, and is 5 miles from the other. On Captain Lutke's chart they are placed in lat. $8^{\circ} 6' N.$, long. $140^{\circ} 52'$. Population 20.

FAIS or *Tromelin Island*.—In 1828, Captain Legoarant de Tromelin discovered a small low island in lat. $9^{\circ} 52' N.$, long. $140^{\circ} 42' E.$, to which Adm. Krusenstern gave his name. It is said that it is 5 miles long and 2 miles broad. Captain Lutke examined it in 1828, and places it in lat. $9^{\circ} 47' N.$, long. $140^{\circ} 38' E.$, calling it *Feis* or *Feys*. The size he mentions is also very different from Captain Tromelin. He says:—This island is remarkable, because it is the only one of the Carolines that has no lagoon; it is formed of madreporic rocks, 30 ft. high, against which the sea beats immediately. It is *four versts* ($2\frac{3}{4}$ miles) in circumference. There is no anchorage in any part. On the South side, where the coast is sandy, there is less surf. Landing was very difficult here, and the natives were not so good sailors as in any other island of the archipelago. Bread-fruit trees were rare, but bananas were in tolerable abundance. Population 300.

ULITHI or *Mackenzie Islands*.—This group was discovered by the Spanish navigator, Egoi, and was seen in 1823 by Captain Mackenzie, who gave some notice of it in the Asiatic Journal for June, 1824. It was partially examined by Capt. Lutke, who states that the native name is Ouluthy.

It was on one of the group, Mogmog, that the Spanish Jesuit, Padre Cantova, was killed on his second visit to the Carolines. This was during the endeavours to establish Catholic missions throughout the archipelago. When Captain Lutke passed Falalep, on which the mission was planted, he was

unable to land; which is to be regretted, as it would be interesting to learn the result of the missionaries' devotedness after the lapse of a century.

The Islands Mogmog, Falalep, and others, on which was this Spanish mission, are at the eastern part of the group. The whole is of great extent, and consists of low coral islands, covered with cocoa-nut trees, and connected by coral reefs, forming a large lagoon inside, with many good passages through the reef leading into it. This group is thickly populated by a light-complexioned race, whose manners and customs are similar to those of the other Caroline islanders. These natives, although apparently mild and friendly to a stranger, are by no means to be trusted, as one or two Manila vessels were cut off at this group some years ago.

The two small islands on the eastern group, *Ear* and *Khilap* or *Hielap*, are connected by a reef to each other and to some others beyond them. These isles are inhabited, and from them a shoal extends for 15 miles to the S.E. The bottom was distinctly visible on its outer edge from the *Seniavine*, but some natives who approached said there was no danger in approaching these islands, though their notions of such danger might be very different from ours.

The western group, which is 8 leagues in extent from North to South, is formed of a great number of small islands (the chief of which are *Mogmog* or *Moguemogue*, *Troilem*, *Falalep*, &c.), united together by coral reefs. The two groups are separated by a channel 8 miles broad, into which Captain Lutke entered as far as the middle. The United States' schooner, *Flying Fish*, entered the lagoon with not less than 7 fathoms on the bar, and procured some fish and cocoa-nuts from the natives. They are now about 200 in number.

The S.W. point of the eastern group, which may be taken as the centre of all the islands, is in lat. $9^{\circ} 56' N.$, long. $139^{\circ} 50' E.$; and the island Mogmog, the northernmost of the western group, is in lat. $10^{\circ} 6' N.$, long. $139^{\circ} 45' 30'' E.$ Captain Wilkes makes the East extremity of them in lat. $10^{\circ} 7' 53' N.$, and long. $139^{\circ} 54' 58'' E.$

EAP or Yap has been seen by many navigators, both in early times and more recently. The Padre Cantova gives it a circumference of 40 leagues, but it is not nearly so extensive. It is frequently made by ships taking the eastern passage to China, and is also called *Unawb* by Captain Horsburgh.

At a distance it assumes the appearance of two or three islands, and when nearer it seems like a group of islands contiguous to each other, the whole encompassed by a chain of black rocks. This deception probably caused Captain John Hunter, who passed it in 1791, to place three islands in this situation.

The island has a pleasing aspect from the sea, being interspersed with many houses. It is estimated to extend from North to South about $3\frac{1}{2}$

leagues, and the position of the North end has been inferred to lie in lat. $9^{\circ} 40' N.$; of the South end the latitude has been given from the mean of several observations, $9^{\circ} 30' 30'' N.$; the longitude, also from numerous observations, from $138^{\circ} 7' E.$ to $138^{\circ} 8\frac{1}{2}' E.$ The southernmost land is low, but rises to the northward into hills. This island is not covered with wood, but many parts appear luxuriant, and abound in cocoa-nut trees. On the southern and western sides the reef is dangerous, and it extends in a W.S.W. direction 2 leagues from the S.W. end of the island. It is steep-to, and some of the black rocks appear just above water near its extremity.

Captain Cheyne says:—The island is surrounded by a coral reef, which extends from its southern end 2 or 3 miles; and more in a W.S.W. direction from the S.W. point. It is possessed of an excellent harbour on the S.E. side, formed in an angle of the coast, by reefs. The entrance, which is through the reef, is about 200 yards wide, and can easily be made out from the mast-head when standing along the reef. When inside the channel widens, and trends more to the northward. The anchorage at the head of the harbour, off the village of Tomal, is perfectly safe, the holding-ground good, and the depth of water moderate.

The South part of the island is low, but it rises into hills towards the centre, which is moderately elevated. It is visible 8 or 9 leagues, and makes in three hummocks, which would lead a stranger passing to mistake it for three islands. There is very little wood inland. The shore in many places is lined with mangroves, and the low lands between the villages are covered with small wood. The cocoa-nut tree is very abundant, particularly on the southern part. The villages are situated near the shore amongst groves of cocoa-nut, bread-fruit, and betel-nut trees. In consequence of the scarcity of large timber, the natives get their proas built at the Pallou Islands, which they frequently visit.

The natives are an able-bodied race, well formed, and of a light copper complexion. They are more advanced in civilization than any of the other Caroline Islanders; their villages being regularly laid out in streets, which are neatly paved. They have also well constructed stone wharves and piers. Each village has a large paved square, where the chiefs assemble for consultation. Captain Cheyne remained here seven weeks in 1843, collecting biche-de-mar.

Eap, as before stated, is thickly populated by a light-complexioned race: they are of a treacherous disposition, and have cut off several Manila vessels which have gone there to collect biche-de-mar. The chiefs confessed to Captain Cheyne, of the *Naiad*, that they had taken two Spanish vessels; the last one having a crew of fifty Manila men, who were all massacred.

The tribe at the harbour had formed a conspiracy to cut them off, but

they were put on their guard by a neighbouring hostile tribe. No merchant vessel passing should have any intercourse with these natives, or allow them on deck, as they are not to be trusted. Dr. Gulick says that the present population is 2,000.

Hunter Reef, a narrow coral reef, over which Captain John Hunter passed in the *Waakzameydt*, July 17th, 1791. He had 16 fathoms water when on it, and saw the bottom very distinctly. It extends nearly North and South, and is about 7 leagues N. by E. of Yap. Lat. $9^{\circ} 57\frac{1}{2}'$ N., long. $138^{\circ} 13'$ E.

NGOLI or the *Matelotas Islands*.—The first notice of these islands was given by Villalobos, who discovered them in 1545, but it would appear that they had been previously visited, for the inhabitants approached holding up a cross, and calling *Buenas dias Matelotas*, from which their name was given. On Captain Lütke's chart they are called the *Western Lamoliaour Group*; Dr. Gulick says *Lamoliork Islands*; and they have been called the *Goulou Islands*. They were seen in 1796 by Admiral Rainier, in the *Suffolk*, who gave them the name of *Spencer Keys*.

The Ngoli or Matelotas group is composed of three small, low, and wooded islands, connected by reefs and sand-banks. The two northern ones bear from each other N.E. $\frac{3}{4}$ E. and S.W. $\frac{3}{4}$ W., and it is dangerous to approach them in the night, as a coral reef projects 2 leagues to the northward of the N.E. island, having in some places high breakers. On January 3rd, 1798, Captain Moring, in the ship *Duckinfield Hall*, had great difficulty in weathering the group. He says:—"How far the reefs may extend to the westward I cannot pretend to say, but they stretched farther than we could see on a clear day. The distance from the northernmost to the southernmost island is about 6 leagues." In 1843 the South island was inhabited, but the population did not amount to more than thirty-five souls, who live entirely on cocoa-nuts and fish. The population of the group is 100.

Captain Cheyne thus describes them:—The South islet, which has cocoa-nut trees, and a few inhabitants on it, is in lat. $8^{\circ} 17'$ N., long. $137^{\circ} 33'$ E. From this to the N.E. islet, which is in lat. $8^{\circ} 35'$ N., long. $137^{\circ} 40'$ E., the reef on the eastern side, is at some distance from the South islet, in detached patches, on which the sea does not break with a westerly wind. The reef extends 6 miles in a northerly direction from the N.E. islet; and its North extreme is in lat. $8^{\circ} 41'$ N. The western islet lies in a S.W. by W. direction from the N.E. one, and is also surrounded by dangerous reefs. Their extent to the West and N.W. has not been ascertained, but they probably connect the islets. There is a passage on the N.W. side of the South islet leading to the lagoon, but the anchorage inside, if any, would be very unsafe. This is a most dangerous group, and should have a good berth in passing, particularly in hazy weather, or dark nights, as the islet cannot be

North Pacific.

seen above 10 or 11 miles in clear daylight, and strong currents often prevail in their vicinity. The southern islet is safe to approach on the South side, as no hidden dangers exist.*

PALAU OR PELEW ISLANDS.

There is no doubt but that these islands are the same as the *Arrecifos* of Villalobos in 1545. According to the Spanish missionaries, Padres Clara and Cantova, the native name is *Paulogue*; other authorities call them *Palaos*, *Pally*, or *Pallou*. In the charts made by Captain Maclier they are called *Pellew*. But the name by which they were generally known is *Pelew*, which, though not exactly correct, has for this reason been retained.

It is very generally known that we acquired a more particular knowledge of these isles and their inhabitants, from the wreck of the *Antelope* packet, Captain Wilson, which was lost upon the coast in 1783. "The captain," says an intelligent writer, "found the natives delicate in their sentiments, friendly in their disposition, and, in short, a people that do honour to the human race. The astonishment which those who first discovered the English manifested on seeing their colour, plainly showed that they had never before seen a white man. The country is well covered with timber trees, the trunks of which furnish the natives with canoes, some large enough to carry thirty men. Yams and cocoa-nuts, being their chief article of subsistence, are attended to with the utmost care. They have also the bread-fruit tree, oranges, lemons, and other fruits. The men go entirely naked; the women nearly so. The conduct of these people towards the English was uniformly courteous and attentive, accompanied with a politeness which surprised those who were the objects of it."

Captain Cheyne says—The *Pallou* natives are quite a distinct race from the Caroline Islanders. They are of a much darker complexion, less robust generally, and of smaller stature, but a great deal more intelligent, and polished in their manners.

Captain Robertson, in his memoir of 1795, has very justly censured the officers of the *Antelope* for not having given, in any part of their narrative, the smallest information, or "said one single word, whether it was possible for a ship to anchor amongst, or near, any of these islands;" and he observes that the only piece of nautical information he could find is the general description of their limits, which he has shown to be grossly erroneous. Captain Robertson says that the group "is a distinct range or chain of

* *Warwick Island*, a whaler's report, in lat. 4° 24' N., long. 136° 26' E., requires confirmation.

islands, extending 28 leagues in length N.N.E. and S.S.W., but in breadth very narrow; they are of moderate height, small in size, and in number almost innumerable; they have often been seen by the India Company's ships, going to China by the eastern passage. In the *Vansittart*, 1781, I had an opportunity of exactly determining their southern extremity and eastern direction; we fell in with that side, and stood on to the N.N.W., thinking to weather them. After getting sight of the northern islands, the wind changed more northerly, which even prevented us from being able to weather the island we at first took to be the northernmost, but which we found was not so; therefore, judging it impracticable to get to windward, without a great loss of time, we wore and stood to the southward, coasting along the islands, at the distance of about 4 or 5 leagues from the East side; rounded the southernmost, at the distance of 3 leagues; from which we took a departure allowing the latitude, by a good meridian altitude, to be $6^{\circ} 56' N.$; the northernmost island I make to lie in lat. $8^{\circ} 9' N.$, from estimated bearings and distance, two hours after the noon observation, which I was happy to find, on comparison, perfectly agreed with the remarks of those ships which passed to the northward of them, and had every opportunity of settling their true latitude. As to their longitude, I am not quite so certain; there is such a discordancy in all the accounts, that it is impossible for me to determine exactly. I have taken the mean of what appeared to me most satisfactory; which, I believe, is not very far from the truth. I had expected much satisfactory and authentic nautical information respecting these islands from Wilson's account of them, published by Mr. Keate; but in that I was sadly disappointed, there being not one useful remark, throughout the whole book, that could possibly be of the smallest utility to a seaman."

A sketch of the southern range of these islands, by Lieutenant John MacLuer, was published by Mr. Dalrymple, in 1791, and the following information has since been collected, but a proper survey is very desirable and necessary.

The circumstance by which this group and its history are made most familiar to English readers, is the account of *Prince Lee Boo*, who was brought over from thence by Captain Wilson, after the wreck of the *Antelope*, Aug. 9, 1783. He was the second son of Abba Thulle, the king, and on his arrival in England evinced such an aptitude for all civilized relations, with such an excellent disposition, that his death, from small pox, which occurred Dec. 27, 1784, when he was twenty years old, was felt throughout England with lively sensation. He was buried in Rotherhithe churchyard, near its N.W. angle, he having died in that parish. The East India Company erected the vault over his remains.*

* An Account of the Pelew Islands, from the Journals of Captain Henry Wilson, by George Keate, 4to., 1788; also a Supplement to the foregoing, by J. P. Hockin, M.A., 4to., 1803.

In the Supplement to the Voyage of the *Antelope* an account is given of the visit of the ships *Panther* and *Endeavour*, which were sent out there with the intelligence of Prince Lee Boo's death. In this portion, too, is the account of Lieutenant Macluer's residence in the group. The whole of these narratives place the natives in a most amiable light. But there is a dark side to the picture; whether from the innate evil of the uncultivated savage, or, what is more probable, from the aggressions of foreign ships touching there, their fame has been sullied by treachery. The *Syren*, whaler, Capt. Coffin, was nearly out off here, March 21, 1823, on passing the southernmost island. They came on board, 100 in number, apparently friendly; but watching an opportunity, they attacked the crew, and were only repulsed after desperate fighting, during which most of the crew, thirty-seven in number, were wounded, and two officers killed.

Captain Ibargoitia remained under easy sail for five days, in 1801, off the islands, and gives as good an account of the natives, with whom he had continual communication, as does Captain Wilson; they most disinterestedly brought off to him fish, cocoa-nuts, bananas, and various roots. He says that Coror Island is the only one where you can anchor; but he was prevented doing so by winds and currents.

The group extends for a distance of 40 leagues, in a North and South direction; its greatest breadth is not more than 5 leagues; but taking into account the surrounding reefs, this breadth would be doubled. It may be separated into several minor groups, described as follows;—

Kyangle Isles.—The northern limits of the group consist of four small islands, the largest of which is called *Kyangle*, having a circumference of 4 miles, in lat. $8^{\circ} 8' N.$, long. $134^{\circ} 50' E.$, or perhaps more correctly, $134^{\circ} 35' E.$ It was called *Moore Isle* by Captain Douglas, in 1788. The three others are called *Arayonzet*, *Carapellas*, and *Korack*. The islands are surrounded by a reef, whose diameter is $4\frac{1}{2}$ miles North and South. Captain Douglas, of the *Iphigenia*, saw two other low or sandy isles at 8 miles West of Moore (Kyangle) Island, which he calls *Good Look-out Islands*, portions of the reef which dry in Macluer's chart.

The Reef to the northward of Kyangle is of a most dangerous character; the more so that there is some uncertainty as to its extent. On Dalrymple's chart it does not exceed the limits of the Kyangle group; but from the evident assertion of Captain Douglas, that it extends to lat. $8^{\circ} 45'$, and that from this it extended to the West further than the eye could reach, so that Admiral Krusenstern has on his chart extended it to long. $134^{\circ} 20'$, and further, as but little is known to the southward of this N.W. extreme, he has continued the reef over all the space to Douglas's Good Look-out Islands.

Kossol.—At 3 miles South from the Kyangle Islands is a small sandy

island, named Kossol, separated by a channel, probably full of banks and breakers, 10 miles broad, from the North end of Babelthuap.

Babelthuap or *Baubelthouap* (the upper sea, in the Pelew language) is the largest of the Pelew Islands. It is 9 leagues long North and South. A high mountain, from the summit of which Lieutenant Macluer could see the whole group, is in its northern part, in lat. $7^{\circ} 40'$. Its eastern extremity, according to Krusenstern's, or rather Macluer's, charts, lies in lat. $7^{\circ} 41' N.$, long. $134^{\circ} 58' E.$; and its northern point in lat. $7^{\circ} 49' N.$, long. $134^{\circ} 52' E.$ But according to Captain Cheyne, commander of the *Naiad*, these longitudes are $18'$ too far East. He made the East end of Babelthuap to be in lat. $134^{\circ} 40' E.$

It is (or was) divided into several districts, of which *Artingall*, *Emmelagui*, and *Emevings*, are the most considerable. Three small islands, *Arteck*, *Kat-tou*, and *Oorokoo*, lie near the North point of the island; and an island of considerable length North and South (with rocky islets along its East side) lies on the S.E. side of the South point, from which it is separated by a very narrow channel. The East side of Babelthuap is fronted by a barrier reef, which commences at the South point of the above island, and about a mile from the East point of Coror. The long detached reef, which forms *New Harbour*, lies outside of this. The barrier trends along the coast in a N.E. direction to lat. $7^{\circ} 36' N.$, where its distance from the shore is about 5 miles; and from that to the northward to the eastern extremity, and in the same direction, in almost a straight line to Kyangle, where it terminates; but from Kossol Island, which is 3 miles to the southward of the Kyangle Isles, it is merely a sunken barrier, or bank of soundings.

Coror, or *Corrora*, is separated from Babelthuap, bearing South from it, by a channel 2 miles broad.

Coror, on which Abba Thulle, the king, resides, is 5 miles in length E.N.E. and W.S.W.; and its greatest breadth, which is near the N.E. end, $2\frac{1}{2}$ miles. A long, narrow, rocky island lies close to the South side of Coror, and three others near its West point. The southeasternmost of the three is named Malackan. It has a tolerably high peak, by which it can be distinguished when outside the reef. Between the rocky island above mentioned, and the N.E. part of Urukthapel, is a good harbour. The entrance to it is through a narrow opening in the reef, or coral flat, which extends from Urukthapel to the South angle of the rocky island. The depth of water in the channel is from 10 to 5 fathoms. A coral patch lies within the passage; and one or two others in the outer part of the harbour. The best anchorage is close to the East side of Malackan, in 15 fathoms, where there is a small run of excellent fresh water. To the eastward of the bluff East point of Urukthapel, and fronting the passage to the above harbour, is a space nearly 5 miles in length N.E. and S.W., where there is no reef, but merely a bank

of soundings, extending about 3 miles from the shore, on which there is good anchorage. A ship may anchor in 13 fathoms with the following bearings, where she will have plenty of room to get under weigh with any wind:—Malackan Peak, N.N.W. $\frac{1}{4}$ W.; the passage through the reef leading to Malackan harbour, N.W. $\frac{1}{4}$ N.; and the East extreme of Babelthuap, or islands which lie near it, N.E. $\frac{1}{4}$ E. Inshore of this the water deepens to 20 fathoms. This anchorage is in about lat. $7^{\circ} 26' N.$

The channel between the South end of Babelthuap and Coror is $1\frac{1}{2}$ miles wide, and is navigable from sea, round the East and North sides of Coror, to the King's village, near its western point, with a depth of from 10 to 25 fathoms in it; but on account of there being a reef, which is 10 miles in length N.E. and S.W., lying to the eastward of Coror, fronting the entrance and several coral patches within this reef, it is too intricate a passage for a stranger to attempt. In Lieut McCluer's plan, 1793 and 1794, published by the Admiralty, from which the islands are delineated on the charts, there appears to be good anchorage inside of this large reef, which he calls New harbour; but Malackan harbour is the best, and the only one which should be resorted to by trading vessels.

The Island of Coror, although small, is the most important of the group, through its being the seat of government. The king and chiefs are most friendly and hospitable to foreigners, particularly to the English, who will receive every protection while within the limits of their jurisdiction. Abba Thulle, the king, nominally claims sovereignty over the whole group; but it is only by force of arms that he is able to uphold his supremacy. The inhabitants of the northern and eastern districts of Babelthuap do not acknowledge his authority, and are often at war with Coror. Vessels trading here should not dispose of fire-arms to any but the Coror people.—(*Cheyne*).

Urukthapel is to the South of Coror. It is of a very irregular form. Its greatest extent is 6 miles North and South. It is moderately elevated, very rocky and barren, but covered with wood. The eastern shore is clifty. From its eastern high bluff patches of reef extend to the southward, with good passages between, until about a mile to the southward of the North point of Errakong, where it becomes continuous, and following the same direction terminates at the passage formed by it and the N.E. islet above described. There is anchorage within this reef on the East side of Errakong, but it must be difficult to get out of with a N.E. wind. The N.W. side of Urukthapel forms a bay, the shore of which is lined with small islets, and there are also several in a bay on its S.E. side. The passage between Urukthapel and Errakong is half a mile wide. The South point of the former is in about lat. $7^{\circ} 14' 30'' N.$, long. $134^{\circ} 24' E.$ Urukthapel is not inhabited.

Errakong lies to the South of Urukthapel. Its South point is in lat. $7^{\circ} 10' N.$, long. $134^{\circ} 23' E.$ The reef which surrounds the two islands on the East side forms to the S.E. of the first a very excellent port, which has two entrances, one to the East, the other to the West. The latter is round the South end of Urukthapel, between it and Errakong and some small islets; but as it is not more than half a mile broad, and is probably not well described, it cannot be recommended to large ships. But to make up for this, there are to the East of the island two other passages across the reef, which may be preferable to it; the first, in lat. $7^{\circ} 14'$, is three-quarters of a mile broad; the second, $1\frac{1}{2}$ miles to the southward of it, is much narrower than the former, but Lieut. Macluer passed it in his vessel.

Orolong, a small island, not more than 2 miles in length, lies off the N.W. point of Urukthapel. Macluer first anchored near this island, and then steered to the S.E., along the coast of the latter island to reach Errakong harbour. The island is in lat. $7^{\circ} 18' N.$, long. $134^{\circ} 19' E.$

Pelelew, a pleasant and fertile island, lies $7\frac{1}{2}$ miles South of Errakong. It is 8 miles long in a N.N.E. and S.S.W. direction. Between its North extremity and Errakong, and within the great reef, there lie, according to Macluer's chart, several islands, one of which, named *Akamokum*, is separated by a reef, across which is a passage not more than a quarter of a mile broad, through which it is thought Macluer passed, as it is stated to be a good channel. At the South extremity of Pelelew, or *Pillau*, the reef which surrounds the group on the West side commences; within its limits are several islands, as *Kylo*, *Kourakong*, and *Imillis*, which appear to be connected with each other by reefs and shoals. The South extremity of Pelelew is in lat. $6^{\circ} 58' N.$, long. $133^{\circ} 21' E.$

Angaur is the south-westernmost island of the group. It is low, and extends 3 or 4 miles in a N.E. and S.W. direction. The channel which separates it from Pelelew is 5 miles broad. It is safe, but there are no soundings the two extremities of the islands being steep-to. Captain Ibargoitia, who beat through to the westward with a westerly wind, could find no bottom even at a mile off the shore. He sent off a boat to the South end of this island to procure water, but it could not approach within 2 cables lengths of it, on account of the shallowness and the surf. The natives attempted to serve them, by bringing some off in their canoes by means of the casks, which were carried half a mile into the woods; but they brought but little, and that not good.

Captain Ibargoitia, who calls this island *Niaur*, determined the latitude of its S.W. point to be in $6^{\circ} 53' 55'' N.$, long. $134^{\circ} 31'$. Horsburgh observed its long. as $134^{\circ} 21'$; the mean may be taken as $134^{\circ} 26\frac{1}{2}'$. But a recent account states that by several measurements, by good chronometers, from Macao and Manila, that it ought to be in $134^{\circ} 6'$, so that, as elsewhere noticed, the whole group has been placed nearly $20'$ too far East.

Directly to the West of the S.W. point of this island, at the distance of half a league, Lieutenant Macluer found a bank with 10 fathoms water; and in 1806 the same commander, in the ship *Mangles*, found a reef extending half a mile from this low sandy point; but Captain Horsburgh, who passed close to the point in the *Anna* in the same year, did not see it, so it was supposed not to exist.

Captain Mc Clellan, when passing around the South end of Angour, at about 2 miles distant, saw breakers and a few black rocks show occasionally for three-quarters of a mile off the South point, and also a few for a good half a mile farther. Lat. $6^{\circ} 55' N.$, long. $134^{\circ} 8' E.$

The archipelagoes to the southward of the Caroline Islands, consisting of the Salomon Islands, New Ireland, New Britain, the Admiralty Islands, &c., are described in our South Pacific Directory; but as the northern coast of New Guinea, although South of the equator, may be considered as the southern limit of the North Pacific, that coast and the islands will be briefly alluded to here.

Anachoretas Island (Anchorites Island) was discovered by Bougainville, August 7, 1768. It is a flat island, about 3 leagues long, covered with trees, and separated into several divisions, connected by reefs and sand-banks. Lat. $0^{\circ} 54' S.$, long. $145^{\circ} 30'.$ There is a great quantity of cocoa-nut trees on the island, and the sea-shore is covered with so great a number of houses, that it must be extremely populous. The natives were fishing in canoes off the island, and they appeared to be happy and contented. At 3 leagues to the West of it another low island was seen from the mast-head (Commerson Island). It is 5 leagues W. by N. from the northernmost of the Anachorètes, and in lat. $0^{\circ} 45' S.$, long. $145^{\circ} 17'.$ —(Bougainville, pp. 290-1).

Los Monjos (the Monks).—Four small low islands, which extend nearly 5 miles in an East and West direction. Maurelle first saw them in 1781, and determined their position to be in lat. $0^{\circ} 57' S.$, long. (corrected) $145^{\circ} 41'.$ Captain Hunter also saw them.

Boudeuse Island was named by Bougainville after his ship, Aug. 9, 1768. It is low, and in lat. $1^{\circ} 26'.$, long. $144^{\circ} 34' E.$

L'Echiquier (the Chess-Board), so named by Bougainville, consists of a large collection of islets. D'Entrecasteaux placed upwards of thirty on his chart, but states that it is probable that in the North part of it many were not seen. They are only a series of low, flat islets, covered with wood. They

all appear to be connected by reefs. The South point is in lat. $1^{\circ} 40' 30''$, long. $141^{\circ} 3'$.

Los Eremitanos, or Herwits, were seen by Maurelle at 8 leagues distant. They are described by D'Entrecasteaux as being high in the N.W. part, and seemed to leave considerable intervals, but, on a closer approach, they terminate in low lands, and are enclosed in a very narrow belt of sand, within which is a large space of still water. They are inhabited; the natives came off in canoes, and apparently were friendly. Their position was perfectly determined; the N.E. islet is in lat. $1^{\circ} 28' 30''$ S., long. $145^{\circ} 7' 45''$.

Matty and Durour Islands.—Two small flat islands, discovered by Carteret, September 19th, 1767. According to D'Entrecasteaux the first is in lat. $1^{\circ} 33' 40''$ S., long. $143^{\circ} 12' 30''$, and the second in lat. $1^{\circ} 46' 0''$ S., long. $142^{\circ} 56'$. Carteret places them in lat. $1^{\circ} 43' 21''$, long. $143^{\circ} 2' E$.

Tiger Island is a discovery of Captain Bristow in 1817, and communicated by him to Mr. Purdy. It is about 6 or 7 miles in length, East and West, and inhabited by a ferocious race of savages. Lat. $1^{\circ} 45' S.$, long. $142^{\circ} 20' E$.

NORTH COAST OF NEW GUINEA.

It will be unnecessary to enter into any general description of this extensive island. Its features, as far as they interest the mariner, will be found in the ensuing description, which is chiefly derived from Admiral D'Urville. Our extracts will be brief here, as its navigation has more reference to the Oriental Archipelago than this work.

DAMPIER STRAIT separates New Guinea from New Britain, and is described in our South Pacific Directory. The best channel through it is on the New Guinea side, keeping the beach in sight, 6 or 7 miles distant.

Rocky Island of Dampier's chart, or *Lottin Island* of D'Urville, is an immense cone of 3,000 or 4,000 feet in height, covered with verdure, with an habitable belt on the sea-shore, without doubt occupied, as was announced by several smokes. A large hollow on its N.E. side still indicates the situation of an ancient crater.

Long Island is remarkable, as Dampier says, for two very projecting peaks, one lying on the North and the other to the South of the island, and which D'Urville named *Reaumur* and *Cerisy Peaks*. The surface of the first is much cut up, and very irregular, and appears to have been a volcano. Off its western point a reef runs out.

Crown Island, also named by Dampier, from its "towering up with several heads or tops, something resembling a crown," is about 7 miles to the N.W. of Long Island. It is about 4 or 5 miles in circumference, and of a very

great height (2,000 feet). The land, as it appeared to D'Urville, though very irregular, did not present these "heads and tops."

CAPE KING WILLIAM, on the S.W. side of Dampier Strait, is very high, and may be seen above 20 leagues distant. It is in lat $6^{\circ} 16'$ S., long. $147^{\circ} 40'$. The coast to the westward of it is composed of the immense *Mountains of Finisterre*, which extend nearly to Astrolabe Gulf, 120 miles further along the North coast. The mountains were roughly computed by Captain R. L. Hunter to be 13,000 feet high. The interval has not been explored.

Astrolabe Gulf, so named after D'Urville's vessel, lies between *Capes Rigné* on the East, and *Duperré* on the N.W., about 24 miles apart, the depth of the gulf being about 18 or 20 miles. The *Finisterre* mountains become lower when near the gulf, which is completely surrounded by a line of mountains, even in the bight of the gulf. On this part a great number of smokes were observed.

Cape Croisilles, a well-marked promontory, lies 10 or 11 miles North of Cape Duperré.

Sir R. Rich's Island of Dampier lies to the N.E. of these points. It is of a similar nature to those already described, and resembles more particularly Crown Island, but is a little larger and not quite so high.

Dampier Island, which is nearer the coast, is certainly not less than 5,000 feet high, in the form of a cone, pointed at the summit, but enlarged at the base to 36 or 40 miles in circumference. Although it appeared capable of cultivation, there was not any smoke or sign of inhabitants seen from the *Astrolabe*.

Franklin Bay is 32 miles N.W. of *Astrolabe Gulf*, and is limited on the North by Cape Gourdon, which forms a well-marked promontory, though slightly elevated. In general, in proceeding to the westward, the coast sensibly decreases in height.

Vulcan Island is an immense cone, clothed with the most beautiful vegetation, and is not more than 12 miles in circumference. It is tolerably well fixed in position, and nothing can render navigation more simple and easy than these peaks planted on the surface of the ocean, serving as beacons for ships to steer by in passing along an unknown coast. At 2 miles to the N.W. of *Vulcan Island* is *Aris Island*, very much smaller, but still very high.

The *Schouten Islands*, which lie off this part of the coast, are eight in number, extending upwards of a hundred miles to the westward. They are very high and conical, which denote an igneous origin. Their height contrasts singularly with the low elevation of the land of New Guinea near them. They are covered with wood, and the main land, very low near the sea, mountainous within.

At 42 miles West of *Bertrand Island*, the westernmost, is a group

several islands, lying very near the coast, *Sainson*, *Faraguet*, and *Dudemaine Islands*. The two first are low, and covered with large trees. *Dudemaine Island* only has a small hill on its western end, of 100 or 200 feet in height, which may be distinguished at a considerable distance among the surrounding low land.

At this part the belt of low land which lines the coast seems to form a large valley between two chains of very high mountains. This configuration would lead to the presumption that a considerable river would flow through this valley. The coast of New Guinea, beyond these, offers nothing agreeable in its aspect. At one part it rises in steep cliffs, and breakers seeming to extend a mile off the shore. Far in the interior the summits of very high mountains may be seen. At 3 leagues in the interior *Mount Eyries* raises its double peak above the clouds. The *Astrolabe* was drifted within half a league of the land, and from the calm was obliged to anchor before a small cove.

While lying near *Mount Eyries*, fifteen canoes, with outriggers, but inelegant, each carrying from three to eight natives, put off and surrounded *D'Urville's* ship. There was not the slightest doubt of their hostile intentions, and every one should, therefore, be guarded against their treachery, when off this coast. From this part of the coast the imposing summit of *Mount Bougainville* becomes visible in the West, raising its head a considerable height above the surrounding mountains.

Humboldt Bay, thus named by Captain *D'Urville*, lies to the West of this mountain. It penetrates deeply into the coast, particularly to the S.E., and it was presumed that in it excellent anchorages might be found. Its opening was about 4 miles in width.

On one side the *Cyclops Mountains*, and on the other *Mount Bougainville*, stand like gigantic sentinels, pointing out the entrance to *Humboldt Bay* to the navigator at the distance of 20 leagues. The position of the entrance was fixed as lat. $2^{\circ} 23' S.$, long. $140^{\circ} 44' E.$ To the West of *Mount Cyclops* the coast descends with a gentle slope to the beach, and has some landing spots, with points more or less projecting.

Matterer Bay, which lies 14 leagues westward of *Humboldt Bay*, is rather deeper than any preceding. To the West of this inlet a low point, covered with trees, *Point Brama*, projects considerably to the N.W.; and beyond the coast again recedes, forming *Walckenaer Bay*. In the rear of these is a high mountain (*Mount Benoist*), situated in the interior. At 50 miles to the West is another lofty chain to which *D'Urville* gave the name of *Gauttier Mountains*, after the great French hydrographer.

"In front of, and at 2 or 3 miles distance from, the low beach in front of the *Gauttier Range*, several small islands followed each other. The largest, *Merat Island*, is not more than 3 or 4 miles in circumference. At the distance we passed them, about 3 miles, they appeared to be covered with

clumps of cocoa-nut and other trees. At 20 miles further are the *Arimoa Islands*. They are three small islets. When at 12 miles from them they appeared as a single island, moderately elevated and well wooded. The chain of the Gauttier Mountains here terminates on the coast. Further to the West the land of New Guinea is very low, and can hardly be distinguished at the distance of 4 or 5 leagues. The great *River Ambernok* or *Rechussen*, debouches here, forming a large delta, and sending a large volume of turbid water into the sea.

"I consider, then, that it is a positive fact that these waters proceed from some considerable river, which discharges itself into the sea on this part of the coast. Bougainville observed the same thing in this part, and from it drew the same deduction. Precisely in this part of New Guinea the land forms a low point, Point D'Urville, very far advanced into the sea, and everything tends to the belief that it is formed by the outlet of a considerable stream."

Point D'Urville is very low and projecting, probably islands; according to the observations made in the *Astrolabe* by M. Jacquinet, it is in lat. $1^{\circ} 24'$ South, long. $137^{\circ} 47'$ E. *Stephen Islands* are placed in lat. $0^{\circ} 20'$ S., long. $137^{\circ} 56'$ E., a doubtful position.

GEELWINK BAY is the very extensive bay of which Point D'Urville may be said to be the easternmost point. We shall not describe it here, but shall terminate our notice of New Guinea with Port Dorei or Dory, or the N.W. point of the bay. Off its mouth are some very large islands, *Jobie Island*, *Mysory* or *Schouten Island*, and others. The last named is very imperfectly known.

Point Geelwink terminates this portion of the coast, and here, perhaps, the immense bay of the same name may be said to commence. West of this is the extensive island of Jobie, and between its West end and Point Geelwink is a smaller one, which nearly closes the passage, and was named by D'Urville, after one of his officers, Quoy Island.

Quoy Island is 8 miles long, and moderately elevated, well wooded, and pleasing in appearance. A channel of only 3 miles in breadth separates it from Point Geelwink, formed by a moderately high hill. A channel of the same breadth separates it from the West end of Jobie, which descends in a very gentle slope to the sea.

The *Traitor's Islands* lie to the North of Jobie, and off the East point of Mysory, forming the North side of the Strait of Jobie. They are small and low.

Jobie Island, which lies in the opening of Geelwink Bay, according to M. D'Urville's chart, is about 90 miles in length, lying nearly East and West. The *Astrolabe* only sailed along its northern side. The land on this coast is high, steep, and covered with woods, without any openings. High mountains form the central ridge. This aspect is preserved in the most

uniform manner, and throughout its whole extent it did not appear to offer a single cove or creek fit to receive a large ship. The mountains of Jobie decrease in altitude on nearing its western extreme, and its West cape is separated from Bultig by a channel 6 miles in breadth.

Bultig or *Hump Island* is hilly, of an irregular form, and 10 or 12 miles in length, but not more than 4 miles broad. Three rounded islets, called the *Three Sisters*, lie near its East point, and before its West point are two similar islets, named by D'Urville the *Brothers*. *Long Island* is tolerably large, and the land in general is but little elevated.

Port Dorei or **Dory** is situated immediately to the South of Cape Mamori, which forms the westernmost and outer point of the entrance of the great Bay of Geelwink.

The harbour is entered by a channel 3 miles in length, formed on one side by the peninsula of *Mamori*, and on the other by the islands of *Mana-Suari* and *Masmapi*, and two banks, which are awash. The harbour itself is not more than half a mile deep, and 200 yards in breadth, with a regular depth of $10\frac{1}{2}$ fathoms, sand and shells. Notwithstanding the confined extent of this basin, ships of any class may calculate on a safe anchorage, and sheltered from the winds and swell from the offing. But as it is surrounded by deep forests, and at the bottom of the harbour there are many mud-banks, often dry, a long stay here would doubtless be unhealthy for Europeans, especially in the rainy season.

All the environs of the harbour, properly so called, are occupied by forests in a state of nature, standing on a coralline soil, which rises with a very gentle slope.

The inhabitants of Dorei are distributed in four villages on the borders of the sea; two are on the North side of the harbour, and the two others on the Islands *Mana-Suari* and *Masmapi*. The total population of Dorei cannot exceed 1,500 souls, all of whom recognise the sovereignty of the Sultan of Tidore.

The result of the observations of M. Jacquinot has placed the observatory at Dorei in lat $0^{\circ} 51' 43''$ S., long. $133^{\circ} 59' 52''$ E.

The following islands are but little known, and but vaguely placed on the charts. The few particulars which are given are derived (unless otherwise stated) from our "*Oriental Navigator*," 1809, pp. 634—641.

ST. DAVID ISLANDS, *Pedan*, *Onata*, or *Freewill Islands*.—This group, about which there is some confusion in the old charts, was seen in the *Warwick*, East Indiaman, in February, 1861. They are represented as two distinct islands, but it is probable that one of them is intended for the Asia Islands. They are very low, are four in number, and with an islet or rock between the North and East islets. The smallest in extent seems to be

the highest, and all of them are well covered with cocoa-nut trees, like most other coral atolls. It is about 14 miles long, and nearly circular, and the surrounding reef projects about a mile from the North and South sides, but not so far on the others. It is well inhabited. The centre is in about lat. $0^{\circ} 57' N.$, long. $134^{\circ} 21' E.$

CARTERET REEF was passed by Captain Carteret in the *Swallow*, in 1767. He passed between the reef and *Evening Islet* to the S.W. of it, and places it in the doubtful position, $2^{\circ} 54' N.$, $134^{\circ} 12' E.$ It is possible that it may be the same as the next.

HELEN REEF was discovered in the East India Company's ship *Helen*, Captain Seton, in 1794. He says:—It is a very dangerous shoal lying W.N.W. and E.S.E., about 6 miles; the East end appeared a dry sand, but on the West part there were rocks a very little above water; no ground with 100 fathoms of line $3\frac{1}{2}$ miles due South of a very conspicuous part of it. I am inclined to think that the reef stretches a good way to the northward, as I saw from the masthead the appearance of breakers running from the West end to the north-eastward. From the centre of the reef, to which I gave the name of *Helen Shoal*, Lord North Island bears N. $75^{\circ} W.$, 40 miles.

The best account we have of it is furnished by Captain Pedersen, of the *Cordelia Berian*, who came to it in Oct., 1858, to recover the cargo of tea from the *Lady Raglan*, wrecked on its West side.

The reef is above 16 miles long in a N.N.E. and S.S.W. direction, and 8 miles wide at its broadest part, which is near its southern end. Its interior is a basin of deep water, encircled by a narrow belt of dark heads of coral, against which the ocean swell dashes with great fury. In sailing round the reef no break was seen through its margin, or foul ground along it, except at its south-eastern point, where white or shallow water extended half a mile outside the breakers, and where there appeared to be a narrow opening into the interior. A rock, with 2 or 3 fathoms over it, was discovered lying West about a mile from the wreck of the *Lady Raglan*, and North about three-quarters of a mile from the extreme western part of the reef.

As no anchorage was found along the reef, the water being ocean deep close-to, the *Cordelia Berian* remained off it under sail from October 4th to November 11th, her boats bringing tea from the *Lady Raglan*. During this period the weather was generally unsettled, with heavy squalls from the W.N.W., then calms, which often placed the vessel in a critical position, the currents being strong and irregular, sometimes setting at the rate of 2 knots to the eastward (or towards the reef*), and at other times as strong to the

* The *Cordelia Berian* lying-to on the West side of the reef, where the *Lady Raglan* was wrecked.

westward. The month of October was more favourable than November; in the former the wind was steadier from the south-westward, and fewer calms; in the latter, there were calms and baffling winds, and the squalls were heavy and the current strong.

The tides ran strong over the reef, the flood to the eastward, the ebb to the westward. The flood sometimes set with such force that the men could not keep their footing in one foot of water. The boats were enabled at times to get across the barrier at the S.S.E. part of the reef when the tide was high, but great care had to be taken to avoid the sharp heads of coral, having 10 to 20 fathoms water close to them.

In light airs or in baffling winds a wide berth should be given to Helen Reef, for the currents in its vicinity are variable and strong, and have occasioned the loss of many vessels on it, and others have but narrowly escaped being wrecked.

The N.N.E. extreme is in about $3^{\circ} 0' N.$, long. $131^{\circ} 52' E.$; the S.S.W. extreme in about lat. $2^{\circ} 46' N.$, long. $131^{\circ} 42' E.$

As before stated, it may be identical with Carteret Reef.

MARIERE, or *Warren Hastings Island*, was first seen by the East India Company's ship *Carnarvon*, Captain Hutchinson, September, 1861. It is about 2 miles long from North to South, and a mile wide. Like other atolls, it is low and well covered with cocoa-nut trees, especially in the northern part, but the middle and southern parts are higher. It is inhabited by people resembling Malays, who are very poor, and can afford no refreshments.

Captain A. Mc Clellan passed it in July, 1855, and found a detached rock off it, although it had been supposed to be clear all round. A reef stretches from both ends of Mariere Island over a mile, with a rock a good mile off, its N.N.E. side showing in the hollow of the sea as a round black islet, about the size of a whale. Horsburgh expressly states that there is no danger near this island. He places this rock in lat. $4^{\circ} 17' 30'' N.$, and long. $132^{\circ} 28' 30'' E.$ *

ANNA, or *Current Island*, was seen by the *Carnarvon*, *Warwick*, and *Princess Augusta*, the China fleet returning in 1761. It is a very small, low island, not more than half a mile in diameter, covered with trees, and surrounded by breakers, which run out from its South end for two miles. Its position may be taken, approximately as $4^{\circ} 39' N.$, long. $132^{\circ} 4' E.$ It is very dangerous in the night, and is inhabited.

* *Warwick Island*, a whaler report, in lat. $4^{\circ} 24' N.$, long. $136^{\circ} 26' E.$, may be derived from an old chart, and refers to Mariere.

SANSORAL, or *St. Andrew Islands*, have been placed 1° too far East on the charts. Captain Maury says that they are in lat. 5° 20' N., long. 132° 20' E.

They were discovered by Padilla, in 1710, are two in number, and said to be connected and surrounded by a reef which is steep-to, and extends but a short distance from either island. *Kodo-kopuei*, the southernmost and largest, is from 1 to 2 miles S.S.W. from Sansoral, the northernmost of the two. They are small, low, flat, and thickly wooded; and may be seen about 12 or 14 miles off. There are about 200 inhabitants on the islands, and these occasionally visit the Palau in their canoes.—(*Reynolds.*)

TOBI, *Lord North*, or *Neville Island*, was seen by the ship *Lord North*, in January, 1781, and was also seen in 1789 by the *Raymond*, and was called Neville Island from a man on board. It is 1½ mile long E.S.E. and W.N.W., with a reef projecting from its East end, but is bold-to in other directions. It is densely wooded, and has 200 inhabitants, who came off in their canoes, but they are bold, and not to be trusted. Lat. 3° 8' N., long. 131° 8' E.

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CHAPTER XIII.

ISLANDS BETWEEN LATS. 10° AND 20° N., INCLUDING THE MARIANA OR LADRONE ISLANDS.

CLIPPERTON ISLAND was discovered, in 1705, by a companion of Dampier's, Captain Clipperton, who separated from him on the coast of South America, to go to the Indies, in which passage he fell in with this *rock* or island. Its position, as given, was not very far from the truth, but its existence was doubted until recently.

Captain Sir Edward Belcher is the first who made us acquainted with the exact character of this rock. He made it May 8th, 1839, at the distance of 15 miles, at the dawn of day; and the sun's rays playing on its nearest face, it had the appearance of a brig close hauled. "The name, Clipperton Rock, certainly misled us, and had we made the point at night, with a fair wind, would almost inevitably have severely damaged or destroyed both vessels. I certainly should have steered to pass it to the northward, merely assuming it to be a solitary rock."

Nothing in this name could lead a seaman to imagine a high rock, placed on the southern edge of a coral lagoon island, 3 miles long North and South, by the same East and West.

Its description should stand thus:—A very dangerous, low, lagoon island, destitute of trees, with a high rock on its southern edge, which may be mistaken for a sail.

This rock can be seen 15 miles. In thick weather the low coral belt, which appears like sand, will not be distinguished until close to it. The breakers on the eastern side do not afford sufficient warning for a vessel to turn or change course. On the northern part of the belt the land is a little raised, and appears to be clothed with something like grass.

There are two entrances, which at high water may be safe; but at the moment we passed, the surf was too heavy, and the reflux showed the rocks bare. The high rock is situated in lat. 10° 17' N., long. 109° 10' W., the

North Pacific.

dangers from it northerly extending 2 miles easterly, and the same north-westerly. On the beach several large trees were observed, and an object, which was thought to be part of a vessel, near the western opening.

In the centre of the lagoon, as viewed from the mast-head, there is one hole of blue water, and a second belt is connected with rock, attaching it to the East side of the island. This literally constitutes two islands formed by its two openings; both are on the weather side of the island.

No living trees were seen, but the whole island was covered with gannet, boobies, frigate pelican, and several kinds of tern, which had also been noticed in great numbers during the previous week, at least 500 miles to the eastward. From this an easterly current may be inferred, as these birds generally keep in its stream or tail course.*

No bottom was obtained by the *Sulphur* with 100 fathoms of line, but the *Starling* had soundings with less than 100 on the northern side.

Sharks, porpoises, and turtle, were observed together. The former annoyed us much by biting at our patent logs, for which one was taken and made an example of. They were very large, and literally swarmed. In all probability they were attracted by a shoal of file (*balistes*), and other small fish, which had been feeding off our copper since quitting the Island of Cocos.

PASSION ISLAND or Rock.—The existence of this has been the subject of much doubt, arising from the very contradictory statements as to its position. It is stated to have been discovered in the early part of the last century, by Captain Dubocage, in *La Découverte*, of Havre, on a Good Friday, and from this circumstance it takes its name. This account is alluded to by Le Barbinaise, who made a voyage to the South Seas in 1714. The position stated is lat. 4° N., long. 106° W., but on Espinosa's chart it is given as lat. $16^{\circ} 54'$ N., long. 109° W. This great incongruity, however, is in some measure set at rest by the following, by Lieutenant Woolridge, R.N. commanding H.M.S. *Spy*:—

"On December 2nd, 1847, observed an island bearing W.N.W., which, though (as laid down) would have been 60' distant, we could only believe to be the Passion Rock. As we passed less than 30' to the West of it in July last, and did not see it, and now passed 60' to the East of it, it is possible it may be laid down 30' too far to the West.

"Latitude and longitude, from bearings and supposed distance, $17^{\circ} 11'$ N., $106^{\circ} 21'$ W. It appeared from aloft high, and peaked in several places."

* It does not follow, therefore, as a matter of course, as noticed by some writers, that the appearance of birds denotes land to windward; they are more likely guided by the tide.

REVILLA-GIGEDO ISLANDS.

This is a small group to the southward of the Californian peninsula, that was discovered in one of the early Spanish voyages. Fernando de Grijalva, in 1523, named the principal island Santo Tomas, now called Socorro. The name of the group is derived from Captain Colnett, in 1793, who gave the name of the Spanish Mexican Viceroy to them, in gratitude for the kindness he had received from him during his captivity.—(Colnett, p. 116).

It was intended by the Spaniards to form an establishment on them, but their natural character prevented this.

SOCORRO or *Santo Tomas* is about 8 leagues in length N.W. and S.E., and about 3 leagues in its greatest breadth. It may be said to consist of one mountain (about 2,000 feet high), which may be seen at the distance of 20 leagues, and falls in gradual descent at all points on the South side. It is in a great measure covered with brushwood, intermixed with low prickly pear trees (*cacti*), and occasionally shaded with other trees of a larger growth. Some few spots of the soil are black and barren, as if fire had lately issued near it; and the top of the high land at a distance has the appearance of there having been formerly a volcano. The surface is of a whitish colour, like that of the pumice stone, which was found on the shore. Neither fire nor smoke were, however, seen to issue from the island.

The vegetables found by Colnett's people were considered as wholesome; they were beans, and the molle tree, whose leaves make a pleasant and aromatic decoction. The prickly pear, an excellent antiscorbutic, grew in great abundance. Numerous land-birds, and plenty of sea-fowl, also afforded food. Fish is very abundant, but difficult to take, on account of the numerous sharks. Water is, however, not to be found, though there are many indications that some must exist, but they have not been discovered.

Captain Colnett considered the safest anchorage, from June to December, to be between the South and S.W. points (*Cornwallis Bay*), opposite to two white coral beaches, which are the first two in succession from the South point of the island toward the West. It is remarkable from the pinnacle rocks, which lie close off the West point of the bay. This bay is preferable in the bad season, as the wind seldom blows more than two points to the southward of East. In the good season, however, that is, from the latter end of December till the beginning of June, the S.E. (or *Braithwaite Bay*), is to be preferred; the anchorage here is better and nearer to the cove, and is the only good landing-place. It is readily known, being a stony beach at the first inlet in the shore to the eastward of the South point. All other parts of the coast on the South side of the island are iron-bound, which makes it difficult, if not impossible, to land, except in very fine weather.

Socorro has been correctly placed on the charts by Captain Sir Edward Belcher. He found its latitude correct; but that it was 52 miles East of its proper position by former observers.

"It is lofty, making in several peaks, the highest probably 2,000 ft. above the sea. The eastern coast is very dreary and forbidding.

"*Braithwaite's Bay* (which was supposed to be that so named previously) has rocky landing, the shores of lava coulé, and nothing like a beach. Neither wood nor water visible, although, from the constant clouds which hang over the high peaks, there must be a supply in some other point. Lieut. Wood examined the western bay, which is spacious. Goats were observed, but no indications of wood or water visible, though, from the presence of animals, it is probable that they find water.

"It is difficult to penetrate into the interior, even for a few hundred feet, owing to the abundance of the *cactus opuntia* (prickly pear), which make those who attempt it suffer for their curiosity. One of the crew of the *Sulphur* made himself ill from eating a large bean, which grew abundantly; but it might have been from indulging too freely, because some were cooked and eaten without injury." Two of Colnett's people were affected in the same way.

The landing-place in Braithwaite Bay is in lat. $18^{\circ} 43' 14''$ N., long. $110^{\circ} 54' 15''$ W.

St. Benedicto Island is the same which was called *Nublada* (cloudy) by Villalobos, in 1542. Colnett calls it *San Berto*. It lies to the N.N.E. of Socorro, 30 miles distant. It is about 6 miles in length N.E. and S.W., and 2 or 3 in breadth, with a few rocks just appearing above water off different parts of it. Its surface is uneven, and its appearance romantic, but barren, with little or no vegetation. At the distance of 9 or 10 miles it appears like two islands. On the West side is a small bay, but it was not examined. Its North end is in lat. $19^{\circ} 22' 40''$, long. $110^{\circ} 44' W.$, according to Colnett's chart.

Roca Partida lies 48 miles E.N.E. of Socorro. It is a dangerous barren rock, lying N.N.W. and S.S.E. by compass, 50 or 60 fathoms long, and 25 or 30 fathoms broad. Both ends are 15 or 20 fathoms in height. The N.W. end is forked; the S.E. end is like a ragged haycock. The two bights are separated by a ragged saddle, that rises 20 or 30 feet nearly perpendicularly from the sea. There is a depth of 35 fathoms at a boat's length off all round; at half a mile distance, 50 fathoms; and then no bottom with 100 fathoms. It shows itself on every bearing, at all distances, like a sail under a jury mast. There is a great quantity of fish, but the sharks prevent them being taken. The only inhabitants of the rock are men-of-war hawks, as at St. Benedicto. Lat. $19^{\circ} 4' 30''$, long. (corrected) $112^{\circ} 4' 0'' W.$

Santa Rosa or Clarion Island.—We have no early account of this island, and its existence was doubted until it was seen in 1815, by Lieut. Ponafidin,

of the Russian Company's ship *Souvoroff*, who calculated its position as lat. $18^{\circ} 28' N.$, long. $115^{\circ} 6' W.$ Captain Fitzgerald, of the *Alert*, saw it in his passage from Callao to San Blas, and placed it in lat. $18^{\circ} 24'$, long. $111^{\circ} 33'$ West. Sir Edward Belcher places *Sulphur Bay* on its South side, in lat. $18^{\circ} 20' 36''$, long. $114^{\circ} 40' 19''$. Captain Fitzgerald describes it as being high in the West part (1,500 feet according to Sir E. Belcher), and about 6 miles long in an East and West direction. When it bears to the N.E. it shows in three summits, which give it the appearance of a group of isles. The South side is clear and steep-to, and the sea beats strongly against it, except in one part, towards the middle, where the shore is sandy, and on which the captain landed with some difficulty. At less than a mile off this part the depth is 11 fathoms.

It has also been seen by an American (Captain Clark, of the ship *Pearl*), who has modestly bestowed the name of *Clarion* on it. It is also called *Cloud Island* on some charts, but this is evidently the name of Nublada Island to the eastward. It is also probably the same as *Best Island*, and *Freshwater Island*, placed near to Cloud Island.*

Sir E. Belcher speaks thus of it:—Clarion Island differs slightly in its features from Socorro, excepting that a whitish coloured fresh-water lake was found at the beach, and birds were more numerous, viz., the gannet, frigate pelican, several varieties of boobies, of tern, ducks, and doves. The plants were more luxuriant, the cactus particularly so, but not so uncourteous as at Socorro—it did not entirely stop the way. No streams were noticed.

Fish were very numerous, and took the bait freely, but they broke the hooks. Turtle were plentiful; two were captured.

Sir Edward Belcher was not fortunate enough to find wood or wholesome water in any way to justify a vessel seeking for those necessities at these islands. Possibly distress might be relieved, but nothing beyond. He sought for the several islands reported in the Socorro and Clarion groups, and passed over the position of Best's Island, which, if it existed within 10 miles, might have been seen; he soon after sighted Clarion Island, not far out of its position as given. Birds, principally gannet, together with broad patches of weed, at times plentiful.†

ROCA CORAL, *Roca Padero*, *New Island*, *Misipi Island*, *New Baldayo Island*,

* The positions assigned to most of these islands was also examined by Lieut. Catesby Ap R. Jones, U.S.N., and no indication of land discovered. Lieut. Jones was of opinion that all of them were erroneous positions of Santa Rosa Island, which, from all these positions was in sight.

† COPPER ISLAND, a lonely spot, if it exists, requires verification, although it has been several times reported. It has been placed, from whaler report, in lat. $20^{\circ} 26' N.$, long. $130^{\circ} 54'$. It is also shown as *Coopers Island*, lat. $20^{\circ} 6' N.$, long. $131^{\circ} 54' W.$, and probably as *Copper's Island*, in the same latitude and in similar East longitude.

&c.—Several islands under the foregoing names have been announced as existing between lat. $16\frac{1}{2}^{\circ}$ and 17° N., long. 133° and 136° W., but the reports have never yet been confirmed, and their existence, whether as referring to a single island, or a cluster of five islands, as has been reported, or a series of detached islands, is still doubtful.

The United States' Exploring Expedition passed through the reported area, and Sir Edward Belcher, in the *Starling* and *Blossom*, Captain Trollope, in *H.M.S. Rattlesnake*, and others, have sought for this cluster of doubtful islands unsuccessfully; but numerous indications of land were met with, medusæ, floating sticks, frequent showers, frigate birds, &c. Sir Edward Belcher says:—"As these latter birds do not go far from land, I am disposed to believe some one of these reports to be well founded, but the position erroneously determined. So many assertions can hardly rest on imagination."

JOHNSTON ISLANDS were discovered December 14, 1807, on board *H.M.S. Cornwallis*, Captain Charles James Johnston. The discovery and place of the group were announced by Lieutenant William Henry Smyth, at that time an officer on board the *Cornwallis*, hence the group is sometimes called by the name of the frigate. The original observations place them in lat. $16^{\circ} 53' 20''$ N., long. $169^{\circ} 31' 30''$ W. They are described by Wilkes, 1840, as a lagoon surrounded by an extensive reef, extending N.E. and S.W. 10 miles, and 5 miles broad. On the N.W. side are two low islets; the westernmost in lat. $16^{\circ} 48'$ North, long. $169^{\circ} 45' 36''$ West, is covered with bushes, but no trees; the other is only a sand-bank. This reef lies deep.

They were examined in 1859 by Lieutenant J. M. Brooke, of the U.S. schooner *Fenimore Cooper*. He landed on them, and obtained excellent equal altitudes, and his observations, which should be preferred, place the flagstaff on the West islet in lat. $16^{\circ} 44' 48''$ N., long. $169^{\circ} 39' 35''$ W. Variation, in 1859, $7\frac{1}{2}^{\circ}$ E. Lieutenant Brooke says:—"It is a lagoon island, the reef being in the shape of a quadrilateral, $3\frac{1}{2}$ miles in a N. by E. $\frac{1}{2}$ E. and S. by W. $\frac{1}{2}$ W. direction, and $3\frac{1}{2}$ miles W.N.W. $\frac{1}{2}$ N. and E.S.E. $\frac{1}{2}$ S. On it are two islets, the smaller being N. 55° E. (true) from the larger, and distant 1 mile. The larger islet is about half a mile long E.N.E. and W.S.W., and here (on the eastern side) are the huts and wharf of the Pacific Guano Company of San Francisco, who claim possession of it; a flagstaff marks its position from the distance. The smaller islet, a mere sand-bank, is less than a quarter of a mile in diameter. Breakers extend to the North, nearly $1\frac{1}{2}$ miles; to the West the reef approaches the larger islet within a mile. A bank surrounds the reef, extending in a S.E. direction 5 or 6 miles, with 10 to 15 and 20 fathoms on it.

The best anchorage is three quarters of a mile S.S.E. from the huts under

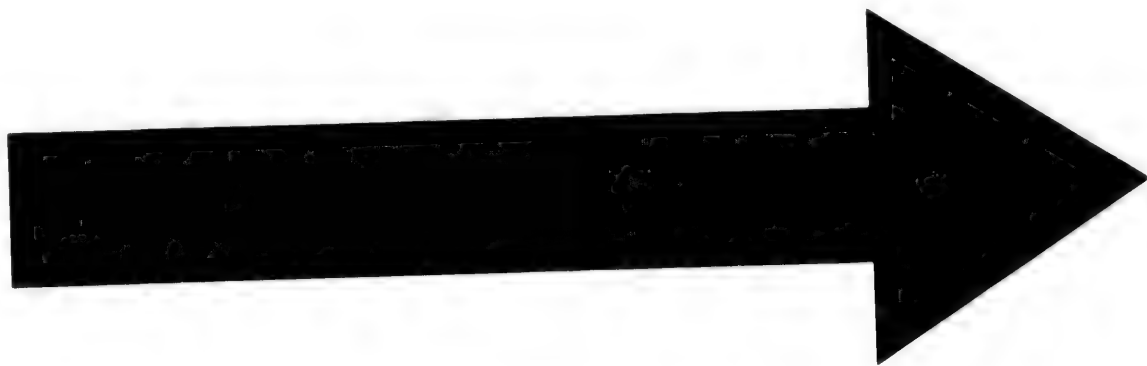
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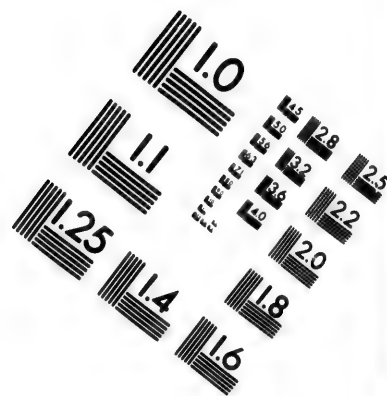
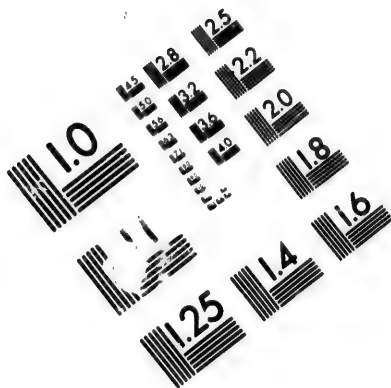
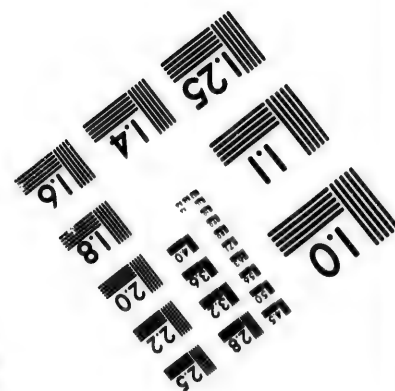
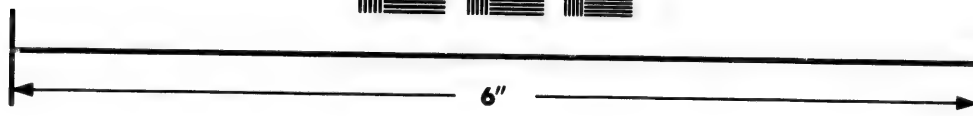
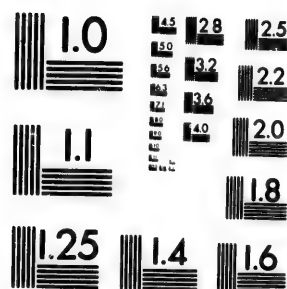


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the flagstaff on the larger island; in running for it the flagstaff should be brought to bear N. by W. $\frac{1}{2}$ W., though there is nothing to prevent its being brought on any bearing between North and N.W.

The sea all round the islets is alive with fish of a superior quality; and birds are extremely numerous.*

SMYTH ISLANDS (or *Gaspar Rico*), a small group, are the subject of some doubt as to their original discovery. On the early Spanish charts, an island, *Gaspar Rico*, is placed between lat 15° and 16° N., and long. 170° E. In 1625, the Dutch fleet, called the Nassau fleet, passed near to a low island, which they believed to be Gaspar Rico. In 1796, Don F. Quintano, in the Spanish ship *Maria*, discovered a group of five small islands, connected by rocky banks, which he believed to be *San Bartolomeo*, discovered by Salazar, in 1536.

Whether these several discoveries refer to the same or different spots is not as yet determined; but on Dec. 22, 1807, H.M.S. *Cornwallis* passed to the northward of a group of islets and rocks extending 17 miles from N.N.W. to S.S.E., the centre of which was in lat. $14^{\circ} 30' 30''$ N., long. $168^{\circ} 42' 15''$ E., from the observations of Lieut. William Henry Smyth, a name afterwards deservedly celebrated as the surveyor of the Mediterranean, &c. The largest of the islands received the name of *Sybilla*; the southernmost *Petrel*; the others *Fruitful*, *Danger*, and *Rabbit Islands*. The northernmost part of the rocky reef was named the *Rocks of Scylla*.

Captain Kotzebue saw these islands March 17, 1817, and sailed along

* The following are *doubtful* announcements which have been made of discoveries in this vicinity:—

Wilson Island, lat. $19^{\circ} 15'$ N., long. $166^{\circ} 40'$ W.

Haystrous Island, lat. $19^{\circ} 6'$ N., long. $163^{\circ} 33'$ W., and an island a degree further West.

Malloon's or *Malcon's Island*, lat. $19^{\circ} 24'$ N., long. $165^{\circ} 18'$ W.

An Island, lat. $16^{\circ} 30'$ N., long. $163^{\circ} 50'$ W.

A shoal, from whaler's report, in lat. $18^{\circ} 26'$ N., long. $173^{\circ} 24'$ W., and another shoal on the same parallel, and in long. $170^{\circ} 30'$.

Jane Island, lat. $16^{\circ} 10'$ N., long. $173^{\circ} 15'$ W., does not exist.

The ships of the United States' Exploring Expedition passed over and near to the positions of many of these islands and shoals in clear weather, and for many hundred miles on their parallel, without seeing anything.

The following are also unknown:—

A shoal, from whaler's report, $13^{\circ} 30'$ N., $170^{\circ} 30'$ W., and island $13^{\circ} 4'$ N. $168^{\circ} 20'$ W.; another island, in $13^{\circ} 0'$ N., $165^{\circ} 40'$ W.; an island in $11\frac{1}{2}^{\circ}$ N., $163^{\circ} 55'$ W., was not seen by the *Josephine*, Capt. Stone.

Gaspar Island, $15^{\circ} 0'$ N., $179^{\circ} 20'$ E., was passed over by the U.S. Exploring Expedition.

The same with *San Pedro Island*, in $11^{\circ} 17'$ N., $170^{\circ} 0'$ W.

their West side. His description entirely accords with that given by Lieut. Smyth and Captain Quintano. His determination of their position is, for the centre, lat. $14^{\circ} 42' N.$, long. $169^{\circ} 3' 30''$; but he concedes the difference, 21', between his own calculation and that of Lieutenant Smyth, to the latter authority. They were also seen by the American brig *Bolivar*, Feb. 9th, 1833, and then named *Farnham Island*.

Lieut. Brooke, of the U.S. schooner *Fenimore Cooper*, examined the western side in 1859; heavy weather prevented a thorough survey of the reef. The side consists of a coral wall, with some clumps of rock scattered here and there. At the northern extremity there are some clumps of rocks partly above water and partly awash, and to the southward a couple of sand-banks a few feet above the water, apparently separated from the northern rocks by a channel, the whole encircled by breakers which do not run out very far, and have a boat entrance into the lagoon. The group extends about 9 miles N.N.W. and S.S.E.; the eastern extent was not ascertained. The reef to the westward is very low and very bold,—nearly steep-to; at the distance of a mile from the breakers, bottom was just reached at 1,000 fathoms. There appear to be some detached breakers about a mile north-westward of the N.W. extremity. Lieut. Brooke made the position of the main clump of rocks at the N.W. extremity in lat. $14^{\circ} 41' N.$, long. $168^{\circ} 56\frac{1}{4}' E.$

WAKES ISLAND was discovered by the *Prince William Henry* in 1796, and its position, &c., fixed by the U.S. Exploring Expedition in 1840. It was seen by Captain Ed. Gardner in the whale ship *Bellona* in 1823. He describes it as being 20 to 25 miles long, with a reef extending 2 miles from the East end, with detached rocks to the West. It was well covered with trees. Captain Sproule saw it in 1858 in the bark *Maria*.

This danger is described by Lieut. Wakes as a low island of triangular form, 8 feet above the surface of the sea, covered by shrubs, with a small reef around it. It has a large lagoon in the centre, filled with a variety of fish, among which are some fine mullet. No fresh water, no palm nor cocoa-nut trees. From appearances, the island is at times submerged, or the sea makes a breach over it. Low water at 1^h on the moon's last quarter. The reef around is very small. Lat. $19^{\circ} 10' 54'' N.$, long. $166^{\circ} 31' 30''$.

The description of Captain Sproule agrees well with this; so that there is no doubt his island is identical with that surveyed by Lieutenant Wilkes. Captain Sproule passed this locality repeatedly above and below the parallel of Wake Island, and gives evidence that all those islands and reefs marked on the charts, under the names of Wake, Halcyon; and Hulsion Islands, are one and the same. Captain Brown, of the missionary ship *Morning Star*, also searched for Halcyon island without finding it.

It is thus very probable that *Halcyon Island*, said by Kotzebue to have

been discovered by an American captain, is the same as Wakes Island, because Captain Wilkes passed by its assigned position without seeing it. Krusenstern calls Wakes Island by the name of Halcyon, on this supposition.*

MARIANA OR LADRONE ISLANDS.

The archipelago of the Marianas or Ladrões is composed of a chain of volcanic islands, which extend in a North and South direction for a space of 140 leagues. Magalhaens, the first circumnavigator, discovered them on March 6th, 1521, but he only saw Tinian, Saypan, and Aguigan. His companions in the voyage named them the "Islands of the latteen sails" (*Islas de las velas latinas*), on account of the triangular form of the sails carried by their prahus. The Spaniards named them also *Ladrões*, from the great propensity to thieving evinced by the natives, although Father Gobien, who wrote a history of the archipelago, states that they hold this vice in detestation. Antonio Galvaom mentions them under the names of *Los Jardines* and *Los Prazeras*, or Pleasant Islands.

It was in 1668 that they received the name of MARIANAS, in honour of the widow of the King of Spain, Philip IV., Maria Anna of Austria. This name has been continued to the present day, and has nearly absorbed all others given previously. In 1564 or 1565, Andreas Miguel Lopez Legaspi came hither, and proclaimed them to be the possession of the crown of Spain, but he stayed here but a very short time.

The advantage which these islands afforded to the Spaniards, by their situation on the grand track from Acapulco to Manila, and the facility in procuring fresh provisions and water here, soon induced them to take actual possession of them. Under the pretext of converting the natives to the Christian religion, they founded, in 1668, in the island of Guahan, a mission under the direction of Padre de Sanvitores, which soon extended its influence over the other inhabited islands. The mutual good understanding, however,

* An island in $19^{\circ} 31' N.$ and $166^{\circ} 35' E.$, as announced in the *Alta California*, another island from whaler report on the same parallel, being 2° further East, and also a bank in $20^{\circ} 0' N.$, $167^{\circ} 40' E.$, must refer to Wake Island.

Besides these the following *doubtful* islands may be enumerated:—

San Bartolomeo Island; Manuel Rodriguez Reef.—An island was discovered, in 1536, by Torito Alonzo de Salazar, called S. Bartolomeo, which is placed on Admiral Espinosa's chart in lat. $15^{\circ} 10' N.$, long $163^{\circ} 43' E.$, without stating upon what authority. It was not found on a search of 100 leagues on the parallel assigned to it by Capt. Merlet of the French marine, in November, 1851. In the memoir of Admiral Espinosa, the Manuel Rodriguez Reef is placed in lat. $11^{\circ} 0' N.$, long. $141^{\circ} 17' W.$; but these indications are so vague that no dependence can be placed on their accuracy. It is sufficient here to mention them.

did not last long between the missionaries and the natives, who after some months had elapsed began to revolt against them. They attacked the fort, and killed several of the Spaniards, but European discipline and fire-arms prevailed, and they were obliged to yield. The war of extermination and the emigration to other islands so destroyed the population, that when Dampier came hither in 1686, that is, eighteen years after the arrival of Padre de Sanvitores, there were not more than 100 natives on the island. Dampier says that the number had been 400, but the Spanish authors magnify them into 40,000 and upwards, a great exaggeration. It was not until 1695 that all resistance was quelled, which proves that up to this date the natives had not abandoned the hope of recovering their independence; but an epidemic finished the work of destruction, and when Anson visited the island of Tinian, in 1742, he found it entirely deserted. This island, which once had a population of 30,000 men, was now only inhabited by wild hogs and cattle.

The reports of Sanvitores, also, confirm the estimates of the population. He says, among other things, that during the first year of his labours he baptized 13,000 people, and converted 20,000; but this must be overrated. The population of Guahan, according to Malespina, amounted to 4,000 people, but he does not say how many of these were of the primitive race. According to Kotzebue, there were but a single couple in 1817, at the death of whom the indigenes would become extinct. This is a sad but true picture of the mode in which the Spaniards *pacified* the natives. The last-named author also tells us that the Americans, who trade in peltry between the N.W. coast of America and China, had formed an establishment on the islands of Saypan and Grigan. For this purpose they had brought some families of Sandwich islanders to cultivate the land and raise live stock; but as soon as the Spaniards heard of this, they sent thither a detachment of soldiery to the infant colony, who destroyed the plantations, and carried with them the Sandwich islanders as prisoners. M. Chamisso, the naturalist in Kotzebue's expedition, has given a detailed account of this enterprise, undertaken in 1810, by Captain Brown, of the American ship *Derby*.

The most complete nautical account and chart of the archipelago was that drawn up by M. de Freycinet, who surveyed a portion of the southern part of the group in the French corvettes *L'Uranie* and *La Physicienne*, in 1819.*

* The accounts of the progress of discovery in this group will be found in *Herrera*, decad. 3, l. 7, et seq.; *Argensola*, Conquista de las Molucas, lib. i.; *Gonzales de Oviedo*, Hist. de las Indias; *Gomara*, Hist. Gen. de las Indias; *Ultimo Viage al Estrecho de Magalhaens*, p. 206, &c.; *Anson's Voyage Round the World*, by Richard Walter, book iii., chap. 2; *Byron's Voyage*, in *Hawkesworth's Collection*, vol. i. p. 116, et seq.; *Wallis's Voyage*, *ibid.* vol. i. p. 279, et seq.; *Portlock's Voyage*, p. 317; *Gilbert's Voyage of the Challenger*, 1788, pp. 66-7; *Voyage of Governor Phillip to Botany Bay*, 1789, p. 255 *Observa-*

The most recent account of this remote (and useless) Spanish colony, is that given by Commander Don Eugenio Sanchez y Zayas, of the visit of the Spanish corvette *Narvaez*, in Dec. 1864 and Jan. 1865. This was published in the *Anuario de la Direccion Hidrografia*, a translation of which was published by the French *Dépôt de la Marine* in 1865-6. To this account we are indebted for many of the subsequent particulars, which are incorporated with the remarks by Freycinet.

There has been much confusion in the names of the northern islets, and this has been increased by the addition to the chart of an island which does not exist. These discrepancies have been rectified by Commander Sanchez y Zayas, as hereafter explained.

From the statistics gathered by Comm. Sanchez y Zayas there were 4,060 inhabitants in 1800, which number increased to 5,406 in 1818; to 8,609 in 1849, and to 9,500 in 1856. But in the last-named year the small-pox broke out in the archipelago, and in the course of that year carried off half the people, reducing the numbers to 4,556 souls.

In 1865 the population was reckoned as 5,610, of which 4,824 were on Guajan, 335 on Rota, 18 on Tinian, and 435 on Saypan; the other islands being uninhabited.

The indigenous race called *Chamorro*s very much resemble the Tagals and Visayos of the Philippines, but are perhaps more indolent,—a fault compensated for by good qualities, of which sobriety and unselfishness may claim notice. The black residents on Saypan are derived from the Carolines, and are naturally active and industrious.

The primitive inhabitants of the archipelago have left some memorials of their talent behind them, like those of the monuments on Easter Island, at the opposite extreme of the Pacific Islands. In Tinian these structures are remarkable. They are described in Lord Anson's Voyage, where a view is given of one, and are mentioned by other and later visitors. Lieutenant Mortimer says they consisted, in the state he saw them, of two ranges of columns, either of stone or composition, and of a pyramidal form, 5 feet 4 inches broad at the base, and 14 feet high, having large semi-globes, 5 feet 10 inches in diameter, placed on the tops, with their flat surfaces upwards. These singular structures, which are not all exactly alike, are supposed by Freycinet to be the supports of a wooden ceiling to which the roofs of the

tions, &c., on a Voyage to Teneriffe, Tinian, &c., in the brig *Mercury*, commanded by C. H. Cox, by Lieut. George Mortimer, 1791, p. 64, et seq.; Voyage de *L'Astrolabe et Zeeu*, tome v. pp. 202—336: Freycinet's Voyage, Paris, 1826; Navigation et Hydrog., chap. xi. pp. 190—221; and the Voyage of the Spanish corvette *Narvaez*, by her commander D. E. Sanchez y Zayas, *Anuario de la Direccion de Hidrografia*, iii. 1865, and a translation of the same by Lieutenant Mac-Dermott of the French Navy, in the *Annales Hydrographiques*, 1866-7.

principal houses were affixed. But this opinion is not participated in by other authors, and a further examination points to the inference that they are sepulchral monuments of the former inhabitants. There are numerous similar remains on the other islands, especially at Asan, near Agaña in Guahan; but here they are smaller and constructed of stone.

CLIMATE.—It rains very heavily at the Marianas, and it may be affirmed that there are no dry and rainy seasons—it rains in torrents every day. The enormous evaporation of the Pacific is condensed in passing over the islands, so that with winds from every quarter rain is abundant at all hours of the day or night. The *Narvaez* was here in December and January, the period of the so-called dry season, but rain was abundant every day, and the natives were surprised at the weather being considered as wet.

The temperature is mild, and much cooler than at the Philippines, but the inhabitants declared that the heat in August and September was almost suffocating. This must arise from the interruption of the N.E. trade wind, which blows throughout the year with the exception of these two months, during which the effects of the S.W. monsoon apparently reaches to the Marianas. At this time there is generally a dead calm, for the monsoon itself has not sufficient force to reach the archipelago. It is therefore the season of intense heat, rain, and storms, and frequently of terrible hurricanes.

Admiral Krusenstern makes the following observations on this subject:—The Marianas lie in the region of the North tropic, and consequently in that of the N.E. trade-winds. But this is not the prevalent wind. The N.E. and S.W. monsoons, which are met with in the China Sea, on the coasts of China, and near the Philippine Islands, extend as far as the Marianas, and sometimes even beyond them; so that the limits between the monsoons and the trade winds must be found somewhere near this archipelago, as is explained in a subsequent page, in treating of the winds and currents.

The currents generally following the direction of the winds, it is probable that it is also the case near the Marianas. But Captain Golownin met with a rapid current bearing to the N.E., although the wind blew from that quarter; and a Spanish officer affirms that a similar current generally flows in this part; but this phenomenon may proceed from some local cause, and is but an exception, and does not affect the general rule.

Between the islands of Tinian and Aguijan a violent current was remarked in the *Centurion*, the direction of which was alternately S.S.E. and N.N.W. This would prove the existence of regular tides. The flood, which bore to the N.N.W., was more rapid than the ebb, and lasted longer. Pasco-Thomas also remarked, that during the syzygies the flood was 2 feet less than at the quadratures, which is contrary to what usually occurs. The greatest rise of water was 8 feet; with S.W. winds the flood rose higher than with other winds.

Observations on the Winds, by M. de Freycinet.—We remarked that in April and May the wind at the Island of Guahan almost always blew freshly from E.N.E. to E.S.E. It sprung up at break of day, became very fresh towards 8 or 10 o'clock, a.m., and was calm during the night. The sky was most generally clear; sometimes it was overcast with thick clouds, which, driven with great rapidity, gave place to showers and strong gusts.

When the horizon was overcast to the S.W., the N.W., and West, with a black mass, not high, the sea began to break on the inner banks at the Luis Harbour. It also occurred that, notwithstanding the continuance of the easterly winds, the S.W. and westerly swell render the narrow passages between these reefs impracticable. During our stay, storms, accompanied by rain, were very frequent, but of short duration. Thunder was never heard.

The monsoons are felt at the Marianas; that from the West takes place from the middle of June to the middle of October. The wind, however, does not blow violently but for three months of the year. Hurricanes are rare, but are not unknown; nor are earthquakes, which, on the contrary, are tolerably frequent. Of the first-mentioned scourges, there had not been one for seven years prior to our visit.

According to Don Lu's de Torres, the months of July to November are the season of bad weather, storms, thunder, and rain; and in December, January, and February, the weather is variable; March, April, May, and June, are the finest; the breeze then comes from East and N.E. The months when the winds blow strongest are August, September, October, and November; they blow at these periods from N.W. to S.W. by W., sometimes from South and S.E., but in general rather between North and West than from North itself.

GUAM,* Guajan, or Guahan, is the southernmost and principal of the Marianas, inasmuch as it is the seat of government, and is also the largest of them. Besides this, it is the only one inhabited to any extent. It is 27 miles in length, in a N.E. $\frac{1}{4}$ N. and S.W. $\frac{1}{4}$ S. direction, and of irregular breadth, 10 miles where widest, and in some parts not more than 3 miles broad. It is bordered throughout the greater part of its circuit with a chain of reefs, which are uncovered at times. Excellent old Dampier thus describes the island:—"At a distance it appears flat and uneven, but coming near it, you will find it stands shelving, and the East side, which is much the highest, is fenced with steep rocks, that oppose the violence of the sea, which continually rages against it, being driven by the constant trade-wind,

* Guam is spelt in the *Atlas Historique of Freycinet's Voyage*, *Gwam*, the *w* being equivalent to the diphthong *ou*. Most of the words usually spelt with this, the Italian *u* or English *oo*, are thus written in the excellent map in question.

and on that side there is no anchoring. The West side is pretty low, and full of small sandy bays, divided with as many rocky points. The soil of the island is reddish, dry, and indifferently fruitful. The fruits are chiefly rice, pine-apples, water-melons, musk-melons, oranges and limes, cocoa-nuts, and a sort of fruit called by us bread-fruit.

"The cocoa-nut trees grow by the sea on the western side in great groves, 3 or 4 miles in length and 1 or 2 miles broad."

It was surveyed by M. Duperrey, under the orders of Captain Freycinet, in 1819. He went round it in a boat; and in the Atlas attached to the Voyage of *L'Uranie* are some excellent and detailed plans.

Point Ajayan is the S.E. extremity of Guam, in lat. $13^{\circ} 14' N.$, long. $144^{\circ} 44' E.$ To the West of it is *Ajayan* (Ahayan) Bay, singularly obstructed by reefs, and thus cannot be used. The South end of Guam is an interrupted sandy beach fronted by reefs, having two or three small islands on it. *Cocos Island*, formerly called *Danóno*, and near to it *Bali Island*, extend off the S.W. point of Guam. It is a mile long, low and barren, with some trees, among which is a single cocoa-nut tree, which gives its name. It is surrounded by reefs, which, extending to the northward, form between it and the actual S.W. point of Guam the small harbour of *Merizo*, fit only for small vessels.

The people at this part of Guam are much afflicted with leprosy, and the towns are full of lepers. The town of *Merizo* is about $1\frac{1}{2}$ mile southward of Umata Bay, and contains only 22 houses, and 146 lazy and dirty inhabitants. The church was built in 1779, but was burnt in 1858. It was thatched again in 1861. The only house that is habitable is that of the padre. The whole of this part of Guam should be cautiously approached.

The *Santa Rosa Shoal* lies to the southward of Guam. Admiral Krusenstern mentions it with some doubt as to its existence, but of this there is no question. Dampier saw it in 1686, on approaching the island. "They sailed over a rocky shoal, on which there was but 4 fathoms water, and abundance of fish swimming about the rocks." The Spanish galleon, too, arrived from Acapulco while he lay at Guam; but avoiding Dampier's ships, sailed to the southward, and struck on this shoal, and was in great danger of being lost there, for she struck off her rudder, and could not get clear till after three days' hard labour. It must be at a considerable distance off, for after some hours' sail they sighted Guam, 8 leagues distant. On Cantova's chart it is made 20 leagues in extent, E.N.E. and W.S.W., and about half as broad. On Mr. Dalrymple's chart, a bank, discovered in 1740 by Galvez, is made to be 10 miles to the S.W. of Guam, in lat. 13° ; but this has not since been found; an American vessel, among others, passed over the site in 1804, without finding bottom. This may be the same as that mentioned by Dampier, but is probably not of the extent delineated by Cantova. Its position may be about lat. $12^{\circ} 30' N.$, long. $144^{\circ} 15' E.$

Umata Bay is 4 miles North of Cocos Island at the S.W. end of Guam. It is about 2,000 feet deep in an E.N.E. direction; its two extreme points are 1,700 feet apart. The South coast is mountainous from *Cape Chalan Aniti* to the bottom of the bay, where the *River Umata* or *Saloupa* enters. It is the usual watering-place. The North coast is low, and the town stands here. The church, built at the foot of the mountain, fronts the eastern part of the bay; a small rivulet, the *Sabo River*, flows between the church and the governor's house. Behind the town the hills rise in an amphitheatre, and are neither high nor remarkable. On the South side of the bay, on the contrary, the *Inago Mount*, opposite the governor's house, is remarkable; and further West is another of 120 or 130 feet high, on the summit of which is the fort of N. S. de la Soledad. Between these two hills a rivulet of excellent water flows, called the *Chioreto*.

Point Tougouéne really forms the South extremity of Umata Bay. It is low, pointed, and guarded by a chain of reefs, which approaches *Cape Chalan Aniti* within a cable's length. To the North of the bay is an isolated and picturesque rock, on which *Fort Sant. Angel* is built. It is approached by steps cut in the rock. About 100 fathoms from it, to the North, is another, *Fort San José*. A ruined battery at the bottom of the bay opposite the church is called N. S. del Carmen. Forts San José and N. S. de la Soledad are plainly discernible by their whiteness. Umata Bay is perfectly sheltered from North and South round by East; but in the season of westerly winds, or from June to September, it is imprudent, or perhaps impossible, to remain here, on account of the heavy sea sent in.

The anchorage is with *Fort Sant. Angel* bearing N.N.E. $\frac{1}{2}$ E. and *Fort N. S. de Soledad* S. by E. $\frac{1}{2}$ E. In the mouth of the bay is 7 fathoms. Good water may be got from the *Chioreto* rivulet.

Umata was destroyed by an earthquake on Feb. 25th, 1849, as shown by stone inscriptions on the ruins of the governor's house and the church; and when the *Narvaes* came here in 1864-5 it was found to be a wretched place, with about a dozen Indian huts. Although the fortifications still looked imposing on paper, they have not a single gun.

The coast trends to N.W. $\frac{1}{4}$ N. 3 miles from Umata Bay to *Point Facpi*, in $13^{\circ} 19' 50''$ N., long. $144^{\circ} 37'$ E., forming several sinuosities in the space, the deepest of which is *Cetti Bay*, as large as that of Umata. *Point Facpi* is remarkable for being pointed, projecting, and terminating in an isolated rock, joined to the shore by breakers, uncovered at low water. Thence to *Point Oroti*, the West point of the peninsula of the same name, the coast presents a bay of 6 miles opening and 2 miles deep, in which are several coves and islets. The town of *Agat* is at the bottom of this bay. Landing is impracticable on the coast here, but the land appears to be very fertile and pleasant.

Agat is now one of the most important places next to *Agaña*. It con-

tains 36 native houses, a poor church, and a stone house for the padre. To the S.W. of Agat, 2 miles distant is *Aloupan* or *Alutung Island*, at the West extremity of a reef stretching two-thirds of a mile off *Point Baugne*. From Agat to Oroté Point the distance is $3\frac{1}{2}$ miles to N.W. The S.W. face of the Oroté peninsula is formed by a cliff, apparently steep-to.

Port San Luis D'Apra.—From *Point Oroté* to the North, and near to which point is a small island, the coast trends first E. by S., then S.E. by S. to the village of Apra; thence it turns to the E. and N., forming a large indentation nearly in the shape of a V, the opening of which is partially covered by a long and narrow island, a mass of coral, *Cabras* or *Apapa Island*, and numerous reefs. The bay is very extensive and safe, but has a great many banks, rocks, and islets. The North side is still further contracted by the continuation of Apra Island in the form of a line of reefs, the *Luminan Reefs*, and the *Calalan Reefs*, which come within the third of a mile of Oroté Island, leaving a very deep channel, the usual entrance. The whole of the northern peninsula is madreporic, and cannot be traversed, on account of the prodigious number of rocks and precipices which cover it. At the isthmus connecting it is the village of Apra, with a rude landing-place. In the centre of the basin is a rock level with the water, on which the *Fort of Sta. Cruz* is built. It is in lat. $13^{\circ} 25' 45.3''$ N., long. $144^{\circ} 39' 45''$ E. The anchorage usually occupied by ships is to the North of this, and is a basin surrounded by coral patches of 2 or 3 ft. beneath the surface. The channels leading to it are frequently narrow, the last before entering the basin not more than 120 yards wide. The banks are very steep-to, and may be approached almost to touching. The depth in the anchoring ground is from 4 to 14 fathoms muddy bottom.

The distance between Apapa Island and Cape Oroté is $2\frac{1}{2}$ miles in a W.S.W. direction; but a coral bank, which extends off Apapa Island towards the West, contracts the passage to one-half the width, which, besides this, is made still more difficult by a shoal lying precisely in the middle of the passage. A vessel, richly freighted from Acapulco, had struck on it a short time before the arrival of Captain Kotzebue. But as there is a good passage on either side of this shoal, half a mile in breadth, this entrance would be scarcely dangerous, if care be taken to mark its two extremities with buoys or flags. The depth in the passage to the N.E. of the bank not being more than $5\frac{1}{2}$ fathoms, coral bottom, Captain Kotzebue advises ships to pass by the channel S.W. of the bank, and to keep as close as possible on the Oroté side, where the depth of water is sufficient for the largest ships. After passing beyond the bank a basin is entered, where anchorage may be taken if circumstances demand it, but as the water in it is of a very great depth, and the bottom is bad, it would be better, if the wind and tides allow, to keep on the course to the inner part of the harbour, where you may anchor at the distance of a quarter of a mile off the small

island of Santa Cruz in 15 fathoms. At the period of Kotzebue's visit, in 1817, there was a battery of three six-pounders on this island.

From the entrance of the port to the Island of Santa Cruz the distance is 2 miles; it would perhaps be dangerous to attempt to beat in or out against a contrary wind, as Kotzebue did; it would be more prudent to wait for the West wind, which springs up every morning at daybreak, and to tow through the narrowest part of the passage. A small river falls into the harbour at $\frac{2}{3}$ of a mile from Santa Cruz Island, and this is the watering place; but the boats ought to be sent at high water, because at other times it would be difficult to reach the mouth of the river. The casks are filled at low water, and you wait for high water to get off again.

The shores of the Bay of Apra are now depopulated, and the villages of Apra at the head of the bay, of Ajayan in the South part of the island, Tarafoto on the East coast, and Ilie near to it, disappeared during the epidemic of 1859. There was only one medico in the whole archipelago, and the small-pox ran its course, and in many cases left not a single survivor. Where Apra stood there is not a hut left to show where it was.

Agat, before mentioned, is at present the place next in importance to Agaña; it contains 36 native houses and a poor church. The village stands at the commencement of the Oroté peninsula, at the head of an open bay 6 miles wide, between Oroté and Fapi Points. There are two or three rocky islets on the reef in front of the place, so that landing is difficult and watering very inconvenient. Soumaye, on the West side of the beach at Apra Harbour, is the place chiefly resorted to by the vessels lying here. It has 29 decent houses, and the people are more obliging here than elsewhere. It is due West of the Fort Sta. Cruz.

Leaving San Luis, the coast runs to the E.N.E., and then North, to Point Acahi-Fanahi, a perpendicular rock, near to which lies the small island of Gapan. The reefs from Apra Island reach to the latter. A mile and a half from Point Acahi-Fanahi is Point Adeloup, better known to the inhabitants as Punta del Diablo, on account of the extreme rapidity of the currents, which make it very difficult to be doubled. A sandy beach commences immediately after Point del Diablo, which trends to the East and North, forming the Bay of Agana, in the middle of which is the small town of Agaña, the capital of the archipelago. Aloupan or Alutung Island forms the N.E. extremity of this bay; it nearly touches Point Apurguan or Apueguan, and makes apparently a secure anchorage, but it is too shallow except for small boats.

AGANA contains the principal part of the inhabitants of the Marianas. It bears the lofty title of the City of S. Ignacio de Agana, but is a small town of 3,500 inhabitants. The greater part of the houses are but poor Indian cabins, thatched with cocoa-nut leaves, but there are a few stone houses for the better classes. The chief buildings are the governor's house, the artil-

North Pacific.

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lery magazine, the church, and the college. The last was founded in 1673, the first establishment in the archipelago. The streets are wide, clean, and regular. A small but clear stream traverses the city, and is crossed by two stone bridges, and the appearance of the place, with its rich vegetation, is pleasant. But the population is lifeless and apathetic. A large portion of the half-breed Indians are copper-coloured, with extremely light hair,—a feature which has arisen from the intercourse of the American and English whalers. Prior to the opening of the Japanese ports they frequently came here. Their visits are now rare.

The town is built on the sea-shore, but in a most inconvenient position. There is not even anchorage before it, for the coral bottom renders a stay impossible, and to be off and on is attended with much hazard. This is the only mode of calling here, unless, which is better, the vessel proceeds to San Luis de Apra.* There is a good road between the two places, the only one on the island, but the distance, a league, is too far to walk in this climate.

The coast from Apuequan Point to *Point Tumun*, is of steep rocks, and all the detached points hence to the northward of the island are absolutely alike. Two miles and a half to the N.E. of *Point de los Amantes* is *Tumun Bay*. It appears to be filled with reefs, but there are several passages through it, where boats can reach the shore, and land without difficulty. Towards the East extremity of the bay, near its middle, and to the South of the village of *Gnaton*, a cross has been erected to the memory of Padre Sanvitores, the martyr of the Marianas, who was killed on this point by a native chief, while he was baptizing a child.

From *Point de los Amantes* to *Point Nigo* the coast trends N.N.E.; it is barren and uninhabited. Above this latter point is the exposed anchorage of *Falcone*.

Point Ritidian is the N.W. point of Guam; it is in lat. $12^{\circ} 38' 54''$, long. $144^{\circ} 51' 58''$ E. A short distance inland the perpendicular hills form, scarcely without interruption, the circuit of the island on the East side. The coral reefs trend to the S.E. to *Point Tagua*, forming the shore. To the East of this the land trends East a mile to *Point Patay*, the N.E. point of the island.

The eastern coast of the island, as far as *Tarafofo Harbour*, offers no shelter to the navigator. It therefore ought to be avoided during the eastern monsoon. The only openings are *Pago Harbour*, in lat. $24^{\circ} 30'$, accessible only for boats, and *Ilio Bay*, 2 miles to the southward, and equally unimportant.

* An instance of the dangerous nature of Agana Bay was afforded by the wreck of the British ship *Invincible*, Jan. 5, 1856. She came in without a pilot, and insisted on leaving next day. With some assistance she got out, but was immediately dashed to pieces on the rocks to West of the entrance; the crew were saved with difficulty.

Port Tarafofo is formed of two small, deep bays, the first of which, Tarafofo, is open to the East, in which direction it is half a mile long, and 300 yards wide. The other is smaller, and is called *Paiepoue Cove*. The *Tarafofo River*, the most considerable in Guam, enters the head of the bay. Madreporic hills, very steep, descend on both sides of the harbour to the water. That of Mahilouc, on the North side, is celebrated in the history of the country. Tarafofo is the only harbour, next to San Luis, which will receive vessels at all seasons of the year. There are no rocks in it, nor is there any danger. A point at the head of the bay, on the South end of the sandy beach, is in lat. $13^{\circ} 18' 9''$ N., long. $144^{\circ} 46' 14''$.

From Tarafofo to *Ulonnia* or *Hounlodgna Bay* the land is low, with sandy beaches and rocky points. The bay is only fit for small boats. *Ynarajan Bay* is a quarter of a mile wide in the opening, and half a mile deep. It is open from East to South. During westerly winds a vessel would be perfectly safe in it, but not with the opposite. The village of Ynarajan is on its South side. It has 126 inhabitants, a church, and house for the priest. Point Goal, on the North side of the entrance, is in lat. $13^{\circ} 16' 30''$ N., long. $144^{\circ} 45' 18''$ E.

Agfayan Bay is three-quarters of a mile from Ynarajan Bay, and is smaller than that. It may have good anchorage for less than 15 or 20 feet. Its mouth is to E.N.E.; at the bottom is a small brook, where boats can readily procure water.

Ajayan Point, the S.E. point of Guam, is in lat. $13^{\circ} 14' 0''$ N., long. $144^{\circ} 44' 0''$ E., and has been before mentioned.

ROTA ISLAND (*Zarpane* or *Sarpan*) called *Luta* by the present inhabitants, lies N.E. $\frac{1}{2}$ N. 10 leagues from the North end of Guam. Its dimensions are 12 miles from N.E. by E. to S.W. by W., its breadth $5\frac{1}{2}$ miles. It is hilly in its East and North portions, particularly so in the centre, where it is about 800 feet high, but becomes lower, in the form of an amphitheatre, to the S.W., to a low and sandy isthmus, where the villages of *Sosanlago* or *Sossan Hagno* and *Sosanjaya* or *Sossan Haya* are built. To the S.W. of this isthmus is the S.W. point, called *Taipingon Point*, a hill terminating in a level and very regular plateau.

The S.E. side of the island is tolerably high and perpendicular on the seashore, presenting thus a straight wall, and at its angles vertical fissures like the embrasures of a fort. In other parts the land descends gradually to the sea, terminating in long and low points. Its N.W. coast and the S.E. of the isthmus are bestrewed with numerous rocks, on which the sea breaks more or less, according to the direction of the wind. The portion of the island not inhabited is so encumbered with bushes (on the North side only are some cocoa-nut trees) that it is difficult to penetrate. Three wells furnish water to the people. Two of them are artificial, and the water is detestable;

a third, which is natural, affords better, though it is brackish. On the East coast, a mile from the village, there is a rivulet of very good water.

Captain Sanchez y Zayas gives the following remarks on Rota :—

The two villages above mentioned are more properly two streets which, collectively, are called *Rota*. They consist of seventy-nine huts of leaves and bamboos, a small hermitage called a church, a house for the padre, and a sort of hovel which they call the royal house. The priest is the only European, and there are 335 inhabitants. There is anchorage opposite to either village. The streets are built on the sandy isthmus, which is so low that the sea threatens to break over it in bad weather. The people then take refuge in a cavern near *Sosanjaya*. This cavern is exceedingly curious, abounding in crystals, and of unknown but great extent. It is stated that there is an extinct crater on the summit of the island, but it must be of great antiquity, for the trees cover it luxuriantly. On the flanks of the mountain there are scattered a great number of ancient stone monuments, apparently sepulchral, and belonging to an age anterior to the Chamorros or last inhabitants.

The anchorage of *Sosanlago* to the N.W. of the sandy isthmus is very bad. There is but a small space for anchorage on the reef, and the bottom is rocky, besides which the depth is most uneven. The *Narvaez* was quite brought up to shoal water, and the anchor dropped in a hole 30 fathoms deep. The ground all around the island is of coral, which will explain this.

The roadstead of *Sosanjaya*, on the opposite side of the isthmus, is as bad as the other, with this distinction, that here the coast is rocky and there is no landing. Although the *Narvaez* was here protected from the N.E. wind and swell, yet to land, the boats had to pull around Point Taipingon for 3 miles to get to the village. Captain Sanchez y Zayas thinks that it is the worst in the Marianas.

The only refreshments to be got here are poultry, bananas, and oranges, which the people will exchange for useful things, such as cloth, nails, or utensils, in preference to money. Water is scarce, bad, and difficult to embark.*

Aguijan Island (or *Agrigan Island*).—At 42 miles N.N.E. of Rota is the small island of Aguijan. It is not more than a league in its greatest diameter. In its North part are high, perpendicular, and nearly naked rocks, but crowned with a thick wood. At a distance this island appears parched

* *Kimball Islands*.—In 1842 Captain Kimball reported (in the San Francisco Herald) that he had seen a group of small islands in 14° 25' N., long. 149° 10' E., or 200 miles eastward of Rota. Nothing more is known of them, and they may be placed as very doubtful.

and barren, but this is not so when closer. At about three-quarters of a mile to the S.W. of Aguijan there are three rocks, small and perpendicular. Between them and the island there is a passage for the largest ship. The island is uninhabited. It is said that the inhabitants of Tinian formerly carried some goats to Aguijan; they may have multiplied greatly, for it is but little frequented. The only points fit for landing are on the West and N.W. sides. They are very small creeks, lined with sandy beaches. Its centre is in lat. $14^{\circ} 53' 30''$, long. $145^{\circ} 30' 0''$ E.

TINIAN, or *Bona Vista*, is separated from Aguijan by a channel 6 miles broad. It has been celebrated for its fertility and the prodigious quantity of cattle. It has now a population of 18! It is 9 miles in extent in a North and South direction, and $4\frac{1}{2}$ miles broad. *Anson Road*, which is on the western side of the island, close to its South point, being open, and the bottom very bad, it cannot be recommended as an anchorage, particularly between the months of June and October. Lord Anson anchored here, August 27, 1742, in 22 fathoms, on a bottom of hard sand and coral; at this position the two extremes of the island bore N.W. $\frac{1}{4}$ N. and S.E. $\frac{1}{4}$ E.; the centre of Aguijan Island, S.S.W.; the peak of Saypan Island was visible over the Island of Tinian, in the direction of N.N.E. $\frac{1}{4}$ E., and a reef of rocks lying between the vessel and the shore to E.S.E. $\frac{1}{4}$ E.

The first account of the Mariana archipelago that deserves the attention of navigators is that given by Richard Walter, the chaplain to Commodore Anson, in his voyage round the world, who came to Tinian as just stated, and remained till the end of October, 1742. Frightful ravages had been made by scurvy in the ill-fated crew of the *Centurion*, in a previous part of her voyage. Their ill fortune had not forsaken them. They arrived here in their floating hospital, and by means of the refreshments spontaneously produced they all recovered in a week. Walter draws the picture of Tinian in the most glowing colours. The healthy and dry soil, the beauty of its natural meadows, the diversified woods and lawns, valleys and hills, abounding with herds of thousands of cattle; guanacoes, wild hogs, exceedingly fierce, but excellent meat; wild fowls, too, in every part; its fruits, guavas, cocoa-nuts in considerable numbers, limes, oranges, and "a kind of fruit peculiar to these islands, called by the Indians *rhymay*, but by us bread-fruit," swell into a long list of luxuries to the declining mariners. The fish that were taken proved obnoxious; Walter supposes from the men eating too much, but Byron afterwards proved that it really was of deleterious quality. The island had no rivulets or running water, but springs were everywhere met with, "and in the midst of the island there are two or three considerable pieces of excellent water." The accounts of Anson's stay, and what they saw in Tinian, led to very great expectation in the succeeding visitors.

When Byron came here, twenty-two years after Anson, he found Tinian a

very different place to what it had been described. Instead of a paradise, it was, in almost all respects, the reverse. The climate was insufferably hot, the water scarce and bad, and the plague of fleas intolerable. Walter, it is true, mentions the last drawback; but Byron says they were covered with them from head to foot, nor could they open their mouths without getting them filled. Added to this, it was found more unhealthy than almost any other place that they had visited. The two accounts of 1742, and Byron's in 1763, could scarcely be more opposite. Wallis, who came here in 1767, draws a picture scarcely more flattering than the latter. Captain Gilbert, who passed it in 1788, says that Captain Wallis's account seemed to be nearest to its condition at that time; so that we may suppose that Lord Byron's picture is somewhat overdrawn, as that of Walter's undoubtedly is. Lieutenant Mortimer, who came here in 1789, in the *Mercury*, got all they required, but the cattle were very wild and shy. The well near the anchorage, so much praised by Richard Walter, and so dispraised by Byron as being brackish and full of worms, was found to be good and sweet; but this may have been the effect of season. Lieutenant Mortimer was here in December, Commodore Byron in August; Captain Gilbert found it dry in August, 1788.

On one point all agree, that is, the badness of the roadstead; we therefore quote Richard Walter's words:—"But the most important and formidable exception to the place remains still to be told; this is, the inconvenience of the road, and the little security there is, in some seasons, for a ship to anchor. The only proper anchorage place for ships of burthen is at the S.W. end of the island; the Peak of Saypan, seen over the northern part of Saypan, and bearing N.N.E. $\frac{1}{2}$ E., is a direction for readily finding it; the anchoring place is then 8 miles distant. Here the *Centurion* anchored in 22 fathoms, about $1\frac{1}{2}$ miles off the shore, opposite to a sandy bay. The bottom of this road is full of sharp pointed coral rocks, which, during four months of the year, that is, from the middle of June to the middle of October, render it very unsafe anchorage. This is the season of the western monsoons; when near the full and change of the moon, but more particularly at the change, the wind is usually variable all round the compass, and seldom fails to blow with such fury that the stoutest cables are not to be confided in. What adds to the danger at these times is the excessive rapidity of the tide of flood, which sets to the S.E., between this island and that of Aguijan, a small islet near the South extremity of Tinian, which, in the galleon's chart, is represented only by a dot. This tide runs at first with a vast head and overfall of water, occasioning such a hollow and overgrown sea as is scarcely to be conceived, so that we were under the dreadful apprehension of being pooped by it, though we were in a 60-gun ship. In the remaining eight months of the year, that is, from the middle of October to the middle of June, there is a constant season of settled weather; when, if the cables are but well armed,

there is scarcely any danger of their being ever rubbed; so that, during all that interval, it is as secure a road as could be wished for. I shall only add that the anchoring bank is very shelving, and stretches along the S.W. end of the island, and is entirely free from shoals, except a reef of rocks, which is visible, and lies about half a mile from the shore, affording a narrow passage into a small bay, which is the only place where boats can possibly land." —(Anson's Voyage, book iii., chap. 2.)

We have been more discursive on Tinian than its merits perhaps deserve, but as it is a point familiar in the history of navigation, it has more interest than it would otherwise claim. When Feycinet came here, in 1819, he found not more than twenty inhabitants on it, and Captain Sanchez y Zayas says that there were eighteen in 1864. The position of the village of *Sunharon*, abreast of Anson's Road, is lat. $14^{\circ} 59' 22''$ N., long. $145^{\circ} 36' 20''$ E.

Captain Sanchez y Zayas says that Tinian is very low, and has no hills of any kind. But pumice-stone, black sand and scoriae, which are found everywhere on it, give certain indications of its volcanic origin. All the western side, except *Sunharon*, is perpendicular, and may be passed close-too, especially at *Point Gurquan*, the S.W. end of which he nearly touched in the *Narvaez*, but still it would be better to give it a berth of half a mile, as the shores are not perfectly known.

In the N.W. part there is a reef which runs off a short distance, and off the eastern side, which is even more perpendicular, and more weather beaten than the western coast. It is said that a reef extends eastward from *Point Lalo*, the South extremity; but it is much narrower than is shown on the chart.

The village of *Sunharon* consisted at the time of the visit of the *Narvaez*, of fifteen huts, inhabited by 15 people, who are sent here from *Agaña*, and changed every two years, for the purpose of slaughtering the cattle and drying the flesh, making what is called *tajea* or *tasajo* (jerked beef), which is sold for the benefit of the Lepers' hospital, and forms one of the small sources of revenue possessed by the islands. At a short distance from the village, on the East coast, is the hospital for incurable lepers, of which there were only three in 1865, creatures condemned without mercy by the Spaniards, but they are cared for by the Indians. The antiquities which are found on Tinian have been before alluded to.

Sunharon is the only point where a vessel can anchor or a boat can land. The *Narvaez* anchored here for five hours in the best spot she could find, and with every caution, but she broke her anchor. This will indicate the worth of the anchorage.

SAIPAN or *Seypan Island*, which is distinguished by a lofty peak, is so close to Tinian that small boats pass from one to the other over the shoal water. This island is fertile, wooded, and was considered the largest of the

Marianas, being $13\frac{1}{2}$ miles in length in a North and South direction, but it is very much smaller than Guam.*

The volcanic cone is of a perfect form, but its elevation has been much exaggerated. Captain Sanchez y Zayas believes that it is not more than from 1,000 to 1,200 feet, but it was not measured. It has been given at double this. At about 2 or 3 miles to the North of this peak there is another extinct crater, moderately elevated on the mountain.

Formerly the island must have been populous, judging from the numerous tombs which are met with, and there are still some caves filled with skulls, which were the objects of veneration before the arrival of the Spaniards. At that period it was entirely depopulated, and has remained so nearly to the present time. In 1810 the Americans founded a colony, or rather a trading post for the whalers, but they were driven away in 1815. About 1842 some natives of the Carolines, whose island had been submerged, obtained permission to settle here, and they founded the village of Garapan on the East coast, which at the time of the visit of the *Narvaez*, in January, 1864, had 433 inhabitants, including 9 Chamorro Indians.

The direction of the western coast of Saipan, beyond the South point, is first N.W., then it turns to the North. It is skirted by coral reefs, extending from 1 to $1\frac{1}{2}$ miles from the shore, and has an arm, formerly much exaggerated in size, stretching to the S.W., and near to the end of which is Managasa Island.

Managasa Island is in reality about $2\frac{1}{2}$ miles to N.N.W. from the N.W. point of Saypan, and has no prolongation of the reef.

Garapan is in lat. $15^{\circ} 12' 11''$ N., and long. $10^{\circ} 3' 24.7''$ East of Umata. It may be recognised from sea at several leagues distance by a large white rock on the shore, resembling a white patch on the dark green of the vegetation. When this bears between North and East you may steer for it, but it must on no account be brought to the South of East or between East and South.

Mañagasa Island will be left to port, guarding against the reef off it, and you may anchor with the flagstaff at the village to the North of East, in 10 to 15 fathoms. Care must be taken not to bring the flagstaff to bear East, because this leads on to the *Tortuga Bank*, which is extremely dangerous and nearly awash, the sea but rarely breaking on it. To the North of this

* Captain Sanchez y Zayas found that the charts of Saypan were very defective, and that many of the names were misplaced. A long reef is shown as running out from the North part of the island, and terminating about 8 miles from its southern point, and on this reef is placed Managasa and two other small islets. Nothing of this kind exists. The chart he has improved is not quite correct, but is better than that previously given.

bank is a series of other shoals, separated by small channels, which unites with those of Mañagasa Island.

There is anchorage also about a mile outside the reefs in 19 fathoms to 7 or 8 fathoms close to them, bringing the most conspicuous of the houses about E.N.E., and Mañagasa Island to North or N. by E. The bottom is generally rocky and coral, but with some sandy spots. The *Narvaez* anchored in 14 fathoms rock and sand, with the West point of Mañagasa N. by E.; the East point N. 14° E.; Saypan N.W. point N. 35° E.; the largest house in Garapan N. 68° E.; N.E. point of Tinian S. 14° W.; N.W. point S. 24° W.

During the period of the N.E. trades this anchorage is safe, but during the season when the S.W. monsoon may reach the Marianas, a vessel would be in great danger here, should she be overtaken with even moderately bad weather.

There is a boat channel across the reefs to the village; it is wide enough and is beacons by the natives with trunks of trees. This channel can be used by day by attending to these marks, but not by night without a competent guide, as the channel is very crooked.

Tanapag is a spacious harbour between the N.W. shore of Saypan and Mañagasa Island. The entrance is difficult, especially for a sailing vessel, with N.E. winds. It is a narrow channel bestrewn with rocky heads, but when within there is a well-sheltered and safe anchorage. The Spanish corvette did not remain long enough to make a plan of it, but from what was learned respecting it, it was concluded that this harbour, and that of San Luis d'Apra, were the only ones in the Marianas, where a vessel of any size could heave down and careen. A whaler of considerable draught had done so in Tanapag.

Magicienne Bay, so named by Captain N. Vansittart, R.N., C.B., in command of the steam-frigate of that name, in July, 1858, is on the S.E. side of Saypan; lat. 15° 8' 30", long. 145° 44'. Captain Sanchez y Zayas says that it is not better than any other part of the coast where there are regular soundings. It is probably safe with S.W. winds (August and September), but it would be better to go to Tanapag. During the rest of the year it would be impossible to remain here on account of the heavy sea. The *Magicienne*, from Hawaii to Hong Kong, being short of fuel, came here to cut wood.

Mr. Harvey, the master of the steam frigate says:—

"This bay cannot be recommended to a sailing vessel, as the water in it is deep, and the anchorage so close to a coral reef bordering its shore, that with a southerly wind there would be no room to weigh. The depth is 30 fathoms, over coral with sandy patches, at only a third of a mile from the bluff at the head of the bay, decreasing rapidly to 3 fathoms close alongside the coral reef, which nearly dries at low water. The *Magicienne* anchored in 18 fathoms water, with the S.W. point of the bay bearing S. $\frac{1}{2}$ E. about 2 $\frac{1}{2}$ miles; the S.E. point, which is a bluff, E.S.E. 1 $\frac{1}{2}$ miles; and a wooded bluff

at the head of the bay, N.N.W. $\frac{1}{2}$ W. nearly a third of a mile. When the vessel swung to the shore there were 9 fathoms, coral patches under her stern, and she was distant only a cable's length from the reef; at a cable's length to the southward of her anchor there was no bottom at 70 fathoms. The bay is well protected, being open only from E.S.E. to South.

"*Supplies.*—There is a plentiful supply of wood growing on the shores of Magicienne Bay, sufficient for any number of vessels, being for the most part the thickness of a man's body, white when cut, and in substance something between a bod ash and a poplar. The best place for landing is on the sandy beach to the eastward of the wooded bluff at the head of the bay. The crew of the *Magicienne* cut down and brought on board 172 fathoms in six days, the wood growing close to the beach, and easily carried to the boats, which could lie afloat close to the coral reef. The wood soon dried, but being freshly cut, it was necessary to split and bark it on board before using it for steaming purposes, also to use a small quantity of coal with it; the bark was very sappy. The wood being free of resinous substances, it did not give out so much heat as might have been expected; three and a half fathoms of it being only equal to one ton of good Welsh coal. No water could be obtained; wells were dug, but the water from them was brackish; indeed there appears to be no water on the island except what is caught during the rains, and the rainy season in August, September, and October. Coconuts, bread-fruit, and limes are plentiful. There are also many wild pigs and bullocks; the latter belong to the Spanish government. Pigs, poultry, and fruit, can be obtained at the village.

"The few days the *Magicienne* remained in this bay the wind was light from the S.E. during the day, and at night a light air from the land between N.E. and N.W.

"It is high water, full and change, in Magicienne Bay, at 6^h 45^m, and the tide rises about 2 $\frac{1}{2}$ feet."

FARALLON DE MEDINILLA (or *Bird Island*) is only 2 miles long, N.E. and S.W.; its breadth much less. It is a calcareous rock, about 50 ft. high, flat, with perpendicular sides. It is barren, and has reddish patches. On the South and West sides are some very deep caverns or grottos. M. Duperry says that the South point is terminated by a small hill, *perhaps* joined to the island by a low isthmus. At its South part is a pierced rock, through which a boat might pass. Freycinet called it *Pointe des Grottes*, and the island itself after the respectable governor of Guam.

Captain Sanchez y Zayas, who examined this island carefully, could trace no resemblance between its form and the French plan.* Either the figure

* The captain of the *Narvaez* adds that all the northern islands of the archipelago were very badly represented; and, as will be mentioned presently, the chart was manifestly very hurriedly drawn up.

of the island has changed considerably, or else the plan is drawn from imagination; the low neck and hummock could not be recognised; all appeared of the same elevation.

The governor of the Marianas stated that there existed vestiges of a crater on its summit. It is undoubtedly of volcanic origin, and is completely bare of vegetation; and not being more than 45 feet high, the sea washes completely over it in heavy weather. Its centre is in lat. $15^{\circ} 59' 20''$ N., long. $146^{\circ} 0'$ E.

ANATAXAN or **Anatajan Island** is 9 leagues N.W. of the last; it is about 5 miles long, East and West. It has two very high and steep peaks lying on the same parallel. To the S.W. only there is a small point slightly projecting. The island has every appearance of being volcanic.

It was seen by the *Narvaex* 40 miles off, although the weather was not very clear. It is very steep to all around. In the southern part only is a sort of creek, in which, however, the water is so deep that a vessel could not anchor. Three peaks are seen from this part, one of which, it is said, is a volcano. Perhaps a closer examination might discover a boat or other landing, because the island was inhabited at the time of the Spanish discovery. It is covered with trees and bushes, among which the cocoa-nut is conspicuous. Lat. of the centre, $16^{\circ} 20'$ N., long. $145^{\circ} 40'$ E.

SARIGUAN ISLAND, to the N.N.E. of the preceding, at 20 miles distant appears to be merely a high hill, of the form of an upright cone, with nearly a circular base, $1\frac{1}{2}$ miles in diameter. Its summit is rounded, and seems to be of volcanic origin.

It was formerly inhabited, but is now completely deserted. Freycinet says that it is almost without vegetation. Sanchez y Zayas says that it is covered with trees; lat. $16^{\circ} 41'$ N., long. $145^{\circ} 47'$ E.

FARALLON DE TORRES or **Zealandia Rocks**.—The first of these names is given from a former governor of the Marianas, who gave a note of their position to all commanders who arrived at Guam. The second is that of the vessel commanded by Captain J. Foster, who drew attention to their existence in 1859. Their previous omission from the charts led to a series of very remarkable errors, as stated in the note below.*

* These rocks were shown as two points to the S.W. of Guguan (but without name) on Epinosa's chart of 1812. They were passed unnoticed in the *Uranie* by Freycinet, in 1819, and that commander, being possessed of a correct list of the islands in their proper order, applied the name Piedras de Torres to the island of Guguan to the North of it, then transposing all the correct names up to Agrigan, which he called Asuncion, placed Pagon at 3 leagues to the North of the island properly so called, but which he called Alamaguan. This supposed island, which they thought they saw imperfectly through the haze, has no existence, and thus this imaginary island, coupled with the omission of the Piedras de Torres, well known to the natives to exist to the South of Guguan, has led to the confusion

The name *Farallon* is perhaps scarcely applicable to them. They are not pinnacled rocks above water, and therefore *Piedras de Torres*, the *Torres Rocks*, best describes them. It may be that the heavy sea constantly beating on them has reduced the height of these evidently volcanic peaks, since their first announcement. They were not seen by the *Narvaez*, but they were described by the shipwrecked people they had on board, and especially by Salas, a pilot, that they consisted of *three* rocks awash, each about as large as a boat, occupying a space about a cable's length, more or less, in extent. There is no appearance of soundings near them, and in fine weather the sea only breaks at long intervals. Their position, as stated, accords with that given by Captain Foster.

The *Zealandia*, under the command of the above officer, from New Zealand to Shanghai, was passing between Guguan and Sariguan on December 31, 1858, supposing the channel to be quite clear and safe, as shown by the charts. He says:—

"At 4 p.m. Sariguan Island bearing S.S.W., distant 12 miles; wind light from the eastward; ship steering W.N.W. about 4 knots, breakers were reported right ahead; saw two large patches about three-quarters of a mile from the ship; altered course to pass about half a mile northward of them, keeping a good look-out from the top-sail yard. At 4.20 p.m. Sariguan Island bore S. by W. $\frac{1}{2}$ W., distant about 11 or 12 miles, and the breakers in one with the island, distant from the ship about half a mile. The two patches bore from each other N. by E. and S. by W., about a quarter of a mile apart, with dark water between and all around them; the sea broke at times heavily."

The weather was threatening, and the day closing, so that Captain Foster did not think it prudent to make a closer examination of them, but his careful observations place them in about lat. $16^{\circ} 51' N.$, long. $145^{\circ} 50' E.$

GUGUAN.—This small island is about 12 leagues from Sariguan. It is

above alluded to. This error was common to all charts after the publication of Duperrey's chart of 1819 until 1866, when Captain Sanchez y Zayas' chart was published by the Spanish Government from the observations made in the *Narvaez*, in 1864 and 1865.

Captain Sanchez y Zayas devotes several pages to the discussion of this important error, and to his passage between these islands.—(See *Ann. Hyd.*, No. 416, pp. 240—250.)

He took from Agrigan and Pagan fifteen persons who were nearly lost on the reef in question in August 1863, and the launch was afterwards wrecked on Pagan. The rectification thus made by the Spanish commander was complete, but as the origin of the mistake is so manifest it does not require many words to explain it. In the ensuing descriptions of these otherwise unimportant islands, they will be noticed under their proper names. It may suffice here to say that *Guguan* was erroneously called *Farallon de Torres*; *Alamagan* was called *Guguan*; *Pagan* was called *Agrigan*, an imaginary island being substituted for *Pagan*. Besides this another imaginary group, the *Mange Islets*, were supposed to have been seen in the *Uranie*, but do not exist.

2 miles from N.N.E. to S.S.W. Its breadth does not much exceed a mile, and it is of moderate height, much resembling the Farallon de Medinilla. Its North point is the lowest; throughout it has a most barren aspect, is perpendicular, and unapproachable on all sides. Freycinet named it after Major de Torres, at Guam, and gives its correct position, lat. $17^{\circ} 16' 50''$, long. $145^{\circ} 50' 15''$ E.

ALAMAGAN or *Alamaguan* is almost exactly North of Guguan, and $5\frac{1}{2}$ leagues distant from it. It lies North and South, $2\frac{1}{2}$ miles long, and is one of the highest in the archipelago. On it are two peaks, as seen from the West, the northern one may be 2,000 feet high. The late Spanish survey makes it 2,300 English feet. To the South and East the slope of the hills is extremely rapid, and the rock, which descends to the sea, is composed of lava. At its South end there are, however, some white and red spots, and to the West a point covered with trees; it is the only place where there are any large vegetables. The North side is not so steep as the South. The highest point on the North side is a vast crater, from whence Freycinet saw smoke issue, as was also the case with another to the N.W., at two-thirds up the mountain. Lat. $17^{\circ} 34' N.$, long. $145^{\circ} 51' E.$

PAGAN (or *Pagon*) is very nearly on the meridian of Alamagan. It was imperfectly seen by Freycinet. Captain Sanchez y Zayas says that it is about 8 miles long N.E. and S.W., and $2\frac{1}{2}$ miles broad. At a distance it makes as two or three islands, because its two ends are mountainous, and are connected by a deep valley. There are *three* active volcanoes on it; one of which is to the N.E., the others to the S.W. The first is a conical mountain, from which there issued dense columns of smoke when the *Narvaez* passed, on January 5th, 1865. The two others to the S.W. are open craters on the large hill, in which the island terminates at this end. One of them is enormous, and flames issued from the other. The valley between the hills is covered with black sand and innumerable bushes. The tropical vegetation reaches nearly to the summit of the mountains, except the N.E. cone, which is quite bare.

There is very little water on the island, but pigs and game may be got in abundance. The *Narvaez* anchored off the N.W. side about the middle, the spot may be known by a large rock, which at 6 or 7 miles off seems to be like an islet. At 3 or 4 cables off this is bad anchorage in 14 fathoms, bottom of coral rocks. Landing is very difficult here, but about a mile to the N.E. of this rock there is a low sandy beach, which has probably better anchorage and easier landing.

This low beach is a very narrow tongue of sand, which separates the sea from a large and very deep lagoon. The governor of the Marianas, who was on board the *Narvaez*, thought that by cutting through this tongue an excellent

harbour would be formed, but such a harbour would be useless.* The volcano at the N.E. end is in lat. $18^{\circ} 7' N.$, long. $145^{\circ} 52' E.$

AGRIGAN or Grigan Island is about 6 miles long, on which are seen two high peaks, apparently a former volcano. Wilkes, by an imperfect observation, made it to be 2,300 feet high. To the S.W. of the island there is, from what M. Freycinet was assured, a small plain, in front of which there is bad anchorage, on account of the violence of the currents. The Americans and some Sandwich islanders were established on this island, on the S.W. side, but were forcibly removed by the governor of Guam, as before stated. Captain Sanchez y Zayas thinks that the above elevation given by Wilkes is very much in excess, as he considered it not more than two-thirds of that height.

Agrigan, seen from a great distance from the South, assumes the form of a perfect trapezium with two small eminences at the upper angles. It is safe all round, and it is very steep. The anchorage may be easily known, because it is in front of the only sandy beach on the island. Bottom will not be found till within 4 cables of the beach, and then the depth is regular, from 15 to 17 fathoms, black sand. The only anchorage is that taken by the *Narvaez*, in 11 fathoms, with the S.W. point of Agrigan bearing N.N.W., and the South point S. $64^{\circ} W.$, about a mile from the landing place, and 3 or 4 cables off shore. To the southward was a large light-coloured patch like shoal water, but there was not less than 6 fathoms water on it. The landing is very bad. The beach is of very coarse black sand, very light and evidently of volcanic origin.

On Agrigan are abundance of cocoa-nuts, bananas, and tropical roots, as well as a large quantity of pigs, goats, and poultry. The present governor formed a curing establishment here, similar to that on Tinian, but for want of means of communication it was abandoned, and then the *Narvaez* took off the men left there, and let loose the animals they had collected, they left the island unpeopled. The island is evidently volcanic, but there are no lava streams, nor appearance of a crater as formerly stated. The soil is very fertile, and the island is covered from shore to summit with vegetation. The S.E. point is in lat. $18^{\circ} 46' 20'' N.$, long. $145^{\circ} 41' 45'' E.$ †

* There is a tale (so frequently told) of *treasure* being buried on Pagan, about 1820 or 1822. The captain of an English schooner came to Agana in order to seek for this treasure, which he had buried here when captain of an English brig, which had come from some port in Peru or Chili at the time of the war of independence. The inhabitants had placed their valuables on board the brig, which sailed off in the night, by the aid of two sailors, whom he afterwards assassinated. The papers which he had apparently fixed the place in Pagan. But the whole story is so vague that it may be fairly placed among the many similar romances.

† The *Mongs* or *Manjas* Islands have been another difficulty in the hydrography of the

ASUNCION or **Assumption Island** is 55 miles N. by W. from Agrigan. It is a conical mountain about a mile in diameter, and with a large crater on the summit. Its eastern side is of lava, and the sea washes up it to a considerable height, at least 260 feet, or double the height of the masts, a certain indication of the great depth of the sea at its base. There is scarcely any vegetation on the eastern side. At the North end of the island is a rock through which the sea has worn a passage. To the North of this point two rocky heads show themselves; they lie about a cable off the point.

On the West side the slope of the mountain is less rapid, and forms a perfect cone; but like the other, the coast is perpendicular. Outside the southern and lowest part of the island there are two or three rocks, but not more than half a cable's length off. All this side is covered with a vigorous tropical vegetation. It is not known whether any one has landed on it since La Pérouse did on December 14th, 1786, when he carefully observed its position on shore.

Asuncion is very lofty, and is consequently from its small base a remarkable object. La Pérouse estimated it at 1,200 feet; Duperrey at 1,700; but Captain Sanchez y Zayas says these figures are evidently too small, and by two angular measurements he obtained a mean height of 802.5 metres or 2,600 ft. The crater is in lat. $19^{\circ} 45' N.$, long. $145^{\circ} 30' E.$

The **URRACAS ISLANDS** are three in number, the largest to the West, the smallest to the N.E. They are moderately high, very irregular, and lie in a circle 2 or 3 miles in diameter. They are connected by breakers which complete the circle around them. The outer part of this circle is of a regular form, but the inner sides are much cut up. The outer side is of a reddish lava, the inner black and calcined. The group appears to have been the summit or crater of an immense volcano, or the ruins of a former peak, twin-brother to Asuncion. It is entirely desolate, neither tree, brushwood,

Marianas. They were first stated by La Pérouse to bear $28^{\circ} W.$ from Assumption (Asuncion), but whether to N.N.W. or S.S.W. was not clear. In the account of Freycinet's voyage they were said to have been seen from the *Uranie's* mast-head, bearing to the S.S.W. of Asuncion, and are so placed on Duperrey's chart. But as La Pérouse says that he never saw the Urracas, they have been placed to the N.N.W. of Asuncion on the French and Spanish charts of 1862, so that they have had two positions on the charts, and in addition to this, the Admiralty chart, gives the name to the Urracas.

This mystery was also cleared up by the *Narvaez*. Her commander sought zealously for them in their assigned positions, steaming over their sites, and finding no evidence of their existence. The conclusion that he justly arrived at was, that this extensive reef and islets were identical with the Urracas, and that La Pérouse's account will perfectly bear out this, as they are clearly visible from Asuncion, and nothing else is in sight in that direction.

nor rivulet is to be seen. Its outer side, beyond the encircling rocks, is evidently very deep, and they drop suddenly into deep water.

It is far from being dangerous; in fact they form an excellent point of recognition, as they may be seen at a great distance, and they are entirely free from danger outside the circle. Lat. $20^{\circ} 6' 35''$ N., and long. $145^{\circ} 20'$ E.

GUY ROCK or *Farallon de Pajaros* is the northernmost of the Marianas. It was discovered by Douglas, September 12, 1789, and is placed under the second name in Espinosa's chart. It was first properly described by Capt. Sanchez y Zayas in 1865. It is really an island, and not a rock or farallon. It is about 1,100 or 1,200 feet high, and $1\frac{1}{2}$ mile broad from North to South, and 2 miles or more East and West. It is a conical mountain, crowned with a volcano in activity, for four or five columns of very thick and black smoke were seen to the S.W. of the summit at a spot which resembled a crater. On the South, East, and North sides the coast is perpendicular, and the sea beats heavily upon them. To the S.E. a large rock lies against the coast, and near this are several others, one of which is very remarkable, resembling a sharp-pointed steeple. To the West the side of the mountain slopes more gradually, but there are no off-lying dangers on this side. There is no landing, nor vegetation, nor reason for going ashore. The summit is in lat. $20^{\circ} 30'$ N., long. $145^{\circ} 8' 40''$ E.

BRITOMART REEF.—In 1869 Captain Bartlett, of the British barque *Britomart*, passed close to a reef, level with the water, and from 400 to 500 feet long. It lies 75 leagues westward of Asuncion, in lat. $19^{\circ} 18'$ N., long. $141^{\circ} 34'$ E.

LINDSAY ISLAND.—This island was discovered by Mr. Lindsay, of the British schooner *Amelia*, during a calm, on Christmas-day, 1848. It appeared about 50 feet high, and 4 miles in length, very barren, and of a dark brown colour. Of its position, lat. $19^{\circ} 20'$ N., long. $141^{\circ} 8\frac{1}{2}'$ E., its discoverer speaks confidently, having proved the rate of his chronometer only two days previously at the Islands of Grigan and Asuncion.

But Captain Bartlett, of the *Britomart*, above mentioned, passed over this position in 1869, but it was not visible from the mast-head in fine clear daylight.

FLORENCE SHOAL.—Captain E. Wadsworth, of the *Florence*, reports as follows:—April 13th, 1862, lat. $18^{\circ} 6'$ N., long. $143^{\circ} 18'$ E., we passed over a shoal of 2 miles in extent; got a cast of the lead in 10 fathoms, coral, but was off the bank before we could sound again. Previous to sounding we passed over some places much shoaler, probably not more than 5 or 6 fathoms; I called it Florence shoal.

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DETACHED ISLANDS AND SHOALS.

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Anson Shoal.—On the old charts a shoal is shown at 140 miles East of Luzon, in lat. 17° 35' N. It may have been seen by Captain Ayer, in the *Earl of Clare*, March, 1848; bottom of large white shells and dark-coloured rocks; water not discoloured; *no soundings*. Lat. 17° 50' N., long. 124° 40' E.*

The Philippine Islands, which limit the North Pacific to the westward, between the parallels included in this Chapter, are described in our **Directory for the Indian Archipelago, &c.**, 1869, pages 794—824.

* Besides this shoal several others are found on the old charts in the neighbourhood of the Marianas, but the positions are so vague, both in latitude and longitude, that nothing certain can be said about them. The following is an enumeration of the chief of them:—

A *shoal*, from Spanish charts, is marked at 5° to the eastward of the Anson shoal above mentioned.

A *reef*, in lat. 16° 32' N., long. 143° 22' E., from the Honolulu Friend.

An *island*, in lat. 17° 0' N., long. 136° 0' E., from whaler report.

A *reef*, in lat. 17° 6' N., long. 159° 14' E., from whaler report.

Folger Island, in lat. 18° 21' N., long. 155° 19' E., was passed over by the flag-ship of the U.S. Exploring Expedition.

A *doubtful shoal*, in lat. 15° 30' N., long. 141° 10' E.

Spanish Islands, in lat. 13° 55' N., long. 142° 10' E.

Anson Islands, repeated, in lat. 13° 0' N. long. 141° 35' E.

Islands from the Spanish charts, in 13° 20' E., 138° 30' E. (The U.S. Exploring Expedition passed near these last positions.)

*Mira-por-vo*s, in lat. 14° 20', long. 143° 20', may refer to the Sta. Rosa Bank, if it exists, or it is otherwise unknown. *Garbanzos*, a degree to the southward, may be the same, but cannot be determined.

CHAPTER XIV.

ISLANDS TO THE NORTHWARD OF LAT. 20° N., INCLUDING
THE HAWAIIAN OR SANDWICH ISLANDS.

THE SANDWICH ISLANDS.

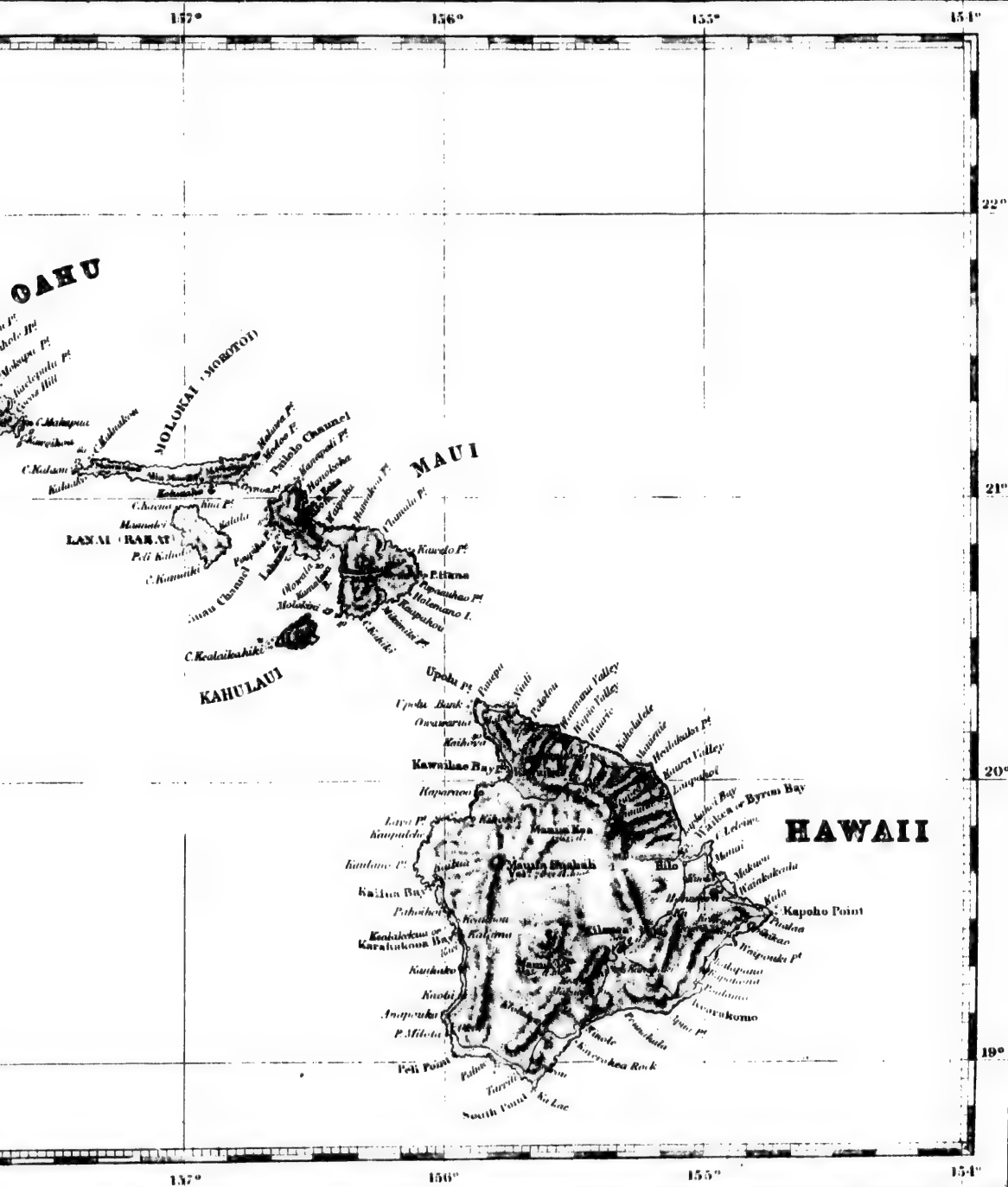
THESE islands were discovered by Captain Cook, in his last and unfortunate voyage. Proceeding from Tahiti, he made the land of Atooi and Woahoo, to the North and N.E., on Sunday, January 18, 1778. They were named by him the Sandwich Islands, in honour of the Earl of Sandwich, the then first lord of the Admiralty, under whose administration he had enriched geography with so many and splendid discoveries.

Although to Cook belongs the honour of thus making them really known to Europe, there are some proofs that they had been previously seen by the early Spanish voyagers, the first of whom was Juan Gaetano, in 1542, who made the first voyage from New Spain to the coast of Asia, though there is no account that he saw them. On the old Spanish charts there is a group marked in the same latitude, but much farther to the eastward than the Sandwich Islands; the southernmost and largest of these is called *La Mesa* (the table); to the N.E. of this is *La Desgraciada* (unfavoured); and to the N.W. is a group of six, collectively called *Los Monjes* (the monks). In the different charts of Lord Anson, taken with the Manila galleon, and those noticed by Burney (vol. v.), they are placed from 10° to 22° farther East than the Sandwich group. They were unsuccessfully sought for by La Pérouse, Vancouver, and others. And as the ancients determined their longitudes nearly by chance, the conclusion is almost irresistible that this group is intended for those under consideration. In this view, if the islands were seen at a distance, *La Mesa* would answer for the flat-topped Mauna Loa in Hawaii, and it is here now suggested that *La Desgraciada* would answer to Mauna Kea; Fleurieu, who was the first to point out this subject, considered that *La Desgraciada* might be a separate and undiscovered island. *Los Monjes* would represent the western islands of the windward group, Oahu,

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Maui, &c., and thus, without much difficulty, all discrepancies would be reconciled except that of longitude.

Other evidences exist of some prior knowledge of European people. Cook found in his first interview two pieces of iron, which could only be derived from Europeans, a piece of iron hoop two inches long, and an apparent point of a broadsword. The feather head-dresses, in the form of European helmets, and the grotesque heads of the same material, which he procured, and are now to be seen in the ethnological room of the British Museum, also indicate a similar origin of ideas. Added to this, the adoration paid to Cook, as the looked-for god, combined with the other traditionary evidence, prove that some former, though nearly forgotten, intercourse had taken place. Be that as it may, to Cook undoubtedly belongs the real discovery of the Sandwich Islands as now known.

It will be unnecessary to enter into the details of the progress of these islands in their early days of European intercourse.

After their discovery they were not visited till 1786, when Captains Portlock and Dixon anchored at Oahu. La Pérouse visited Maui about the same time. Vancouver spent several months here in 1792 and 1793. He introduced the present breed of cattle, and during his stay the Island of Hawaii was ceded to the British crown. The first missionaries were landed at Kairua, in Hawaii, February 4, 1820, from Boston, United States. Some from England soon followed, and their zeal and industry soon effected a wondrous change in the character of their converts; and one most prominent circumstance arising out of it was the visit of the King Laho-Liho and his queen, with a native suite, to England, in 1822. They unfortunately died soon after their arrival. H.M.S. *Blonde*, under the command of Lord Byron, was commissioned to convey their bodies back to their kingdom, a proceeding which made a most favourable impression in Hawaii. Matters would have gone on well but for religious intolerance. The Protestant missionaries both English and American, had increased; but in 1827 some Romish priests were introduced; they were expelled in 1830. In 1836 the Romish propaganda again introduced themselves, but great bigotry on both sides led to most serious results. It gave occasion to the French government to act with very great harshness, and finally to take possession of the islands.

The most prominent circumstance in this affair is that of the *Clementine*, a brigantine under the British flag, in 1839, which was forcibly entered, and made to retain on board two French missionaries brought by her on her late voyage from California. To adjust this outrage, Captain Sir Edward Belcher endeavoured to convince the missionaries and the king (Tamehameha III.) of the impropriety of this step. The French frigate, *La Venus*, 60 guns, appeared at this critical moment, and Captain Du Petit Thouars acted with Sir Edward Belcher in the matter, and the missionaries were for a time lauded, and an acknowledgment given that reparation should be made to the

owners of the *Clementine*. After this the government and the state of society became disorganised, and after much controversy the French took possession of the Sandwich Islands, August 25, 1849.

This interference was subsequently adjusted, and the power of the king settled on a firm basis. A constitution simple, but stringent, and adapted to the requirements of the people, was promulgated in 1864, and the integrity of the kingdom has been guaranteed by a tripartite treaty between England, France, and the United States. The government is monarchical, and based largely on that of Great Britain. The king governs by a cabinet and a legislative chamber. Each island has its viceroy, and life, property, and justice are as secure as in any country in the world. Unfortunately party politics and intrigues mar at times what might otherwise be the perfect happiness of a simple community.

The natives and their habits have been too often described to need much being said here. When Cook first landed, their astonishment was extreme. They were above the middle size, and well made; their complexion rather darker than those of Tahiti, and altogether not so handsome a people. Most of their former customs, so much dilated on in the early accounts, have passed away, and are generally superseded by European habits and manners, not perhaps altogether advantageous to them.

The estimate of Cook, in 1779, that there were 400,000, is generally believed to be much too large. Probably 300,000 would be nearer the truth. One thing is certain, that there must have been a vastly greater population then than now, as is evidenced by the rich taro land now lying waste on all the islands; and in the districts of Kau, Waimea, and Kohalu, on Hawaii, it will be very evident that three or four times the number of people must have lived to have cultivated it.

The following statistics will show that the decrease has been rapid. The population in 1823 was estimated at 142,050; and according to the census of 1832, 130,315; and from that of 1836, 108,579. The decrease appears to have been in progress almost from the date of their discovery. One cause, at least, has added to this; the number of young men who leave the islands in whalers and other ships, and never return. The number annually afloat is computed at 4,000. Their wives and children, thus left to want, fall into vicious habits and destruction. Another cause is the mortality of 1848, the "year of death," when it is supposed that 10,000 were swept from the islands by the measles, whooping-cough, and influenza combined.

The last census, taken in 1866, gave the following as the result of the population. Besides the islands thus enumerated there are *Molokini*, *Lehua*, *Kaula*, and *Nihoa*, which are uninhabited, barren, and very small. The area of the islands given below is a new estimate from the charts, and differs considerably from the official statement.

THE SANDWICH ISLANDS.

821

PRESENT POPULATION OF THE KINGDOM.

	Area sq. geo. m.	Foreigners.	Natives.	Total.
Hawaii	2,640	572	19,226	19,808
Maui	413	605	13,430	14,035
Kauai	422	392	5,907	6,299
Oahu	383	2,574	17,225	19,799
Molokai	98	29	2,270	2,299
Lanai	98	9	385	394
Niihau	65	13	312	325
Kahulae	19	0	0	0
Total.....	4,148	4,194	58,765	62,959

The present king *Lot-Kamehameha V.* was born December 11, 1830. He is the son of the governor Kekuanooa and Kinaou, daughter of Kamehameha I., and succeeded his brother Kamehameha IV., in November 1863.

In 1862 an English missionary bishop, Dr. Staley, arrived at Honolulu, and a beautiful cathedral, chiefly of worked stone, sent out from England, has been erected.

The one great source of prosperity in former years was the whale-fishery. This important branch of commerce, which has been referred to previously, attracted such a concourse of the New England and other whalers to the North Pacific, that in 1859 the number which visited the Sandwich Islands to refit amounted to 549 square-rigged vessels. In 1846, 674 vessels touched here, chiefly whalers. Of the moral advantage to the natives of this influx of licentious sailors, little can be said, but it brought much wealth. After that year there was a very sudden and great decrease. The amount of sperm and whale oil, and whalebone, decreased to less than one-half, or one-third of what it was in 1858, when it was at the maximum, 222,464 gallons sperm 2,551,382 gallons whale oil, 1,614,710 lbs. whale bone, in 1858; reduced to 47,859 gallons of sperm, 782,086 gallons whale oil, 572,900 lbs. whale bone, in 1860; and these items became reduced in 1862 to less than one-third of what they were in 1860. After that they began to increase slightly, so that the whale ships which entered were 73 in 1862, 102 in 1863, 140 in 1864, and 180 in 1865. Since this period this source of revenue has so much declined, while others have increased, that it is no longer looked on as the staple commerce of the islands.

The development of the commerce and increase of the population in California, and the consequent trade which has steadily progressed with San Francisco, and also the advance of British Columbia, and the intercourse with the free port of Victoria, are now the real sources of prosperity to the Hawaiian Islands. They may be considered as the "West Indies" of N.W. America, and their fertility and great adaptability for the growth of sugar, coffee, cotton, &c., only await the influx of capital and labour to make them

capable of supplying the whole of the countries on the N.E. Pacific with these necessities.* But the restrictive duties imposed at San Francisco (amounting to from 50 to 100 per cent. on the value of the sugar), has much interfered with that trade.

In 1867 there were 33 sugar plantations in operation, comprising about 11,000 acres. The cost of producing sugar is about 3 cents. or 1½d. per lb. Rice was produced to the extent of 1,000,000 lbs. Wool is also largely grown; there were above 1,000,000 sheep, including large flocks of merinos, on the islands. The island of Niihau was purchased of the government by a Scotch family from Canterbury, New Zealand, for a sheep farm. Cotton failed somewhat on account of drought and from worms, but was largely grown. Coffee was also blighted for above 10 years.

Excellent coal from Vancouver Island can be had for about 11 dollars, or 44s. per ton, Australian coal for the same price, and the best Welsh steam coal at about 14 dollars, or 56s. per ton.

Now that the Pacific railway is in operation, and San Francisco has become, as it were, a station on the high road to China and Japan, these islands seem to be destined as a stopping place for the trans-oceanic steamers, lying as they do immediately in this route, either from thence or Panama.

THE WINDS, which are most prevalent on the Hawaiian Archipelago, are those from the north-eastward. This trade wind, which prevails for a great portion of the year, is interrupted when the sun is in high South latitude, or during the northern winter. From the geographical position of the islands near to the tropic, the northern edge of the trade wind recedes to the southward of their latitude in this season, and then the anti-trade wind from the westward, shifting between N.W. and S.W., is frequently heavy and changeable, being a struggle between the two systems, and forming the equivalent to what are called the "horse latitudes," in the North Atlantic. They bring abundant rain on to the opposite sides of the islands, which have the rain during the summer months. These westerly winds set in usually in January, and continue till the middle of April, or commencement of May, when the trade wind again sets in.

The CLIMATE of the Sandwich Islands is generally temperate and healthy, for a sub-tropical region; it would appear to resemble that of the West Indies, though more temperate in the higher lands, being not too hot to pre-

* When it is remembered that the commerce and productions of the volcanic island of Mauritius, in the same latitude South that these islands are North, are at the present day nearly thirty times greater than those of the Sandwich Islands, whilst the latter have several times greater area and available land, as well as greater diversity of climate and resources, it will be readily seen what an opening is presented for future commerce, and how valuable this trade may become to Great Britain, especially if Victoria be preserved as a free port.—*Mr. Consul-General Syngé, 1865.*

vent white men working, even in agricultural pursuits. From the constant nature of the wind, the temperature and climate generally vary on different sides of the islands, and from their insular character and their great elevation, the clouds are intercepted, and rain is consequently abundant in some localities, and drought the characteristic of others. Thus the North side of Kauai is 3° cooler than the South side from this cause, and it rains 9 months of the year, and from this the country is clothed in perpetual green. On the West side of Hawaii, on the other hand, rain seldom falls on the coast, and a rainy day once a year is considered remarkable. The range of the thermometer on the windward side of the islands is from 54° to 86°; on the lee side it seldom falls so low as the former temperature. The climate is healthy, none of the intertropical diseases are known, nor do fever, ague, or cholera occur.

Bishop Staley gives the following as a brief summary of the climate. Situated only just within the limit of the northern tropic, and in the region of the N.E. trades, which blow the greater part of the year, and convey the ocean vapour, condensed into clouds, over the mountains and table lands, then to fall in fertilizing showers; the country enjoys a luxuriant and delicious climate. The average annual temperature is 77° Fahr., with only a few degrees of variation above and below. But the local climates are varied, depending on aspect and elevation. At Waimea, on a plateau about 4,000 feet above the sea level, in the North of Hawaii, a fire in your bed-room is necessary. On the other hand the houses at Honolulu and many other places are built without chimneys, no fires being needed at any period of the year. Generally speaking, there is more rain on the windward than the leeward sides of the island. Hence the rich hues of the eastern slopes of Hawaii, covered with verdure and cultivation, contrast strongly with the bare and arid look of the coast on the greater part of the western side.

There is no tropical wet season, in the ordinary sense of the term—that is, at the summer epoch. On the contrary, the wettest part of the year is when the sun's vertical is farthest removed from the northern tropic, viz., in December and January. Then abundant rain falls, storms of great violence, called *Konas*, suddenly arise, and the inter-island navigation has to be suspended (1868).

On the West side of Hawaii the land and sea-breezes are very regular; there are also strong North winds, but the most severe gales are those from S.W., which as stated the natives term *kona*. These last from a few hours to two or even three days, and are followed by rain; they are seldom strong enough to injure the houses.

The TIDES are comparatively inconsiderable, and, with the heavy swell setting upon the outer reefs, difficult to estimate, but they are very regular, flowing and ebbing six hours each. The *flood* comes from the eastward; and it is high water, at full and change of the moon, at 3^h 45^m apparent time.

Their greatest rise is 2 feet 7 inches, and the water is always observed to be 4 inches higher when the moon is above the horizon than when it is below.

The CURRENTS in the immediate vicinity of the islands at first sight would seem to be very uncertain; sometimes setting to windward, and at other times to leeward, without any regularity. They do not appear to be governed by the winds nor other cause; they frequently set to windward against a fresh breeze.

But whatever may be the irregularity of the current within the influence of the archipelago, a circumstance related by Vancouver incontestably demonstrates that, beyond them, they follow, at least at times, some general law. When at Kauai he saw a noble canoe, 61½ feet long, formed from a single *pine* tree, which wood does not grow on the islands. Its origin was more singular than the canoe itself. It was a tree drifted on to the East end of Kauai in a perfectly sound state, without a shake or a bruise. This circumstance of fir timber being drifted on to the northern sides of the islands is by no means uncommon, and but little doubt can be entertained that they had come from the West coast of America. This would prove, as would at once be supposed, that the usual current in the offing came from N.E.

Another circumstance also bears with great weight upon the current drifts and the direction of the winds. On a former page we have noticed the singular circumstance of the wreck of a Japanese junk near Cape Flattery, in Oregon, in 1833. About the same time, a junk laden with fish, with nine hands on board, left one of the southern islands of the Japanese archipelago for Jedo, but encountering a typhoon, was driven to sea. After wandering about the ocean for ten or eleven months, they anchored, on the last Sunday of December, 1832, near the Harbour of Waialea, Oahu. The Hawaiians, when they saw a strange people, much resembling themselves in person and in many of their habits, said, "It is plain now we come from Asia." How far their unwilling course was regulated by current of course could not be exactly ascertained, but it would appear probable that, being blown off to the northward, a current, relatively similar to the Gulf Stream of the Atlantic, may have carried them eastward, and then within range of the south-westerly current, which drifts pine timber.

Sir Edward Belcher experienced a strong current to W.N.W. when off Honolulu, and it frequently runs at the rate of 1½ mile per hour. These considerations must greatly influence all navigation conducted between the islands.

EARTHQUAKES are common, especially in Hawaii, where the volcanoes are still in activity. Of course they are more severe in that island than in the others, where the subterraneous fires seem to be extinct.

Several very severe visitations have been recorded since their discovery,

and in some cases the phenomena, which have been carefully observed and recorded, afford very interesting subjects for the physical geographer. The earlier eruptions apparently arose from Kilauea, those of more recent times from Mauna Loa.

The first recorded is an eruption of Kilauea in 1789, but no particulars worth reciting are stated in connection with it. The next was an eruption from the same volcano in 1823, when the lava flowed to the sea at 12 miles from the equator. The third was in 1832, and was an eruption from Kilauea, and also from the summit of Mauna Loa, when lava flowed for two or three weeks, and is supposed to have entered Kawaihae Bay. The fourth was on May 30, 1840, when lava flowed from the side of Kilauea, and formed a stream 18 or 20 miles long.

The fifth eruption began on Mauna Loa on January 10th, 1842, when a stream of lava issued from its summit, and, running northward, it divided, one branch towards Hilo, and a second towards Kawaihae. On Feb. 15th, 1852, another stream of lava issued from the same crater, and, with some interruptions, continued for a month, but did not reach the sea.

A most alarming eruption from Mauna Loa commenced on August 11th, 1855, and the lava continued to flow for thirteen months, until it covered an area estimated at 300 square miles. Again, on Jan. 23rd, 1859, another great stream of lava burst forth, and flowed for six months, reaching the sea to the S.W. of Kawaihae.

The last and greatest eruption on record commenced by some slight premonitions, in March, 1868, by some earthquakes. These shocks became so numerous that 2,000 were counted in a short space of time. Some of these were very destructive, and accompanied by the great sea-wave and a mud eruption which swept away and buried villages, men, cattle, &c., and on the 7th April, ten days after the first symptoms of the convulsion, a new crater opened on the flank of Mauna Loa; a stream of lava flowed into the sea half-way between Apua and the southern point, the mud-flow meanwhile wending its course to the North of this direction. One of the fairest parts of the island was thus in a single day converted into a black-looking, desolate tract of cinders and mud. In many places in Kau the ground has opened, chasms of unknown depth have formed, whence sulphurous exhalations are emitted; a fissure, some miles in length, has extended inland from the coast, crossing one of the island high roads, and so deflecting it that what were contrary sides before are, at the point of breakage, now in one and the same straight line. The floor of the crater in the Kilauea volcano has sunk considerably. At Lahaina, upwards of 100 miles from the starting point of the eruption, the column of cloud ascending from it was observed under an angle of $3^{\circ} 30'$, which (allowing for 500 feet of altitude, the position of the observer) indicated a height of nearly 8 miles. So vast a body of vapour rushing visibly upwards with tremendous rapidity, proved the pre-

sence of an immense heat at its base; the great rarefaction by heat of the air near the new crater would cause a powerful upward draught; then the cold air, charged with the vapours of the surrounding sea, must rush in. For days after the eruption, the leeward islands were enveloped not only in a close oppressive atmosphere, but in clouds and heavy rains. A very distinct odour of sulphurous acid was perceptible at Honolulu 180 miles distant, two days after the eruption. The earthquakes were continued at intervals for some months.

The archipelago consists of twelve islands, which were discovered by Cook in his last voyage; and to these may be added two small ones to the N.W., seen at later periods. Of these six are uninhabited and are barren rocks. They will all be described in order, commencing with the S.E.

Throughout the archipelago there is every evidence of their upheaval, and the dates of these elevations are manifest in the conditions of the different islands. Those to the westward are the most ancient, Nihoa and Niihau are the oldest; Kauai, Molokai, and Maui follow; and Hawaii, the largest and most recent, is still in activity. But although it is asserted that the western islands are the oldest, it may not be strictly correct, except in the sense that the evidence of recent volcanic action is least evident there. But everywhere there are marks of a gradual or convulsive elevation of the group. On Molokai, in the middle of the islands, coral is found at 500 feet elevation, and in Kauai coral beds lie at 4,000 feet above the sea. It is in Hawaii itself, however, that the grandest evidence of the plutonic origin of the islands is most evident and active. In the other islands lava streams and extinct craters are recognisable, but in the great island some of the most terrible phenomena of volcanic disturbance have been shown in late years, as will be briefly noticed in the description of that island.

There is very great variation between the orthography used by the early voyagers and that subsequently adopted by the missionaries on a more intimate knowledge of the language. The latter mode is, of course, to be considered as the correct one, and is that placed first in these pages.

HAWAII, the south-eastern, and by much the largest of the group, is called *Owhyhee* by Cook and others. Kotzebue calls it *O Wahi*; Freycinet and others, *Owhyhi*. All these words are representations of the same sound.

Hawaii is of a triangular form; the West side, running generally North and South, is 100 miles in length; the N.E. side is 84 miles, and the S.E. side is 64 miles long; so that its whole circumference may be taken as 250 geographical, or 288 British statute, miles.

The mountains of Hawaii do not ascend in peaks, as do many other volcanic islands, such as Eimeo or Teneriffe, but rise gradually and comparatively unbroken, particularly from the southern shore to the lofty summit of

Manna Loa. Its appearance altogether is less romantic and picturesque than Tahiti, but it is more majestic and grand.

There are but few inland settlements on the East and N.W. parts of the island, but in general the interior is an uninhabited wilderness. There is a vast central valley between the three great mountains. This central part is a great desert of lava, of every known kind. It is only the northern plain, the eastern slope, and some portions of the South and West, which are productive, and where are to be found sugar estates, and cattle "ranches" and sheep runs equal to any in the world.

There are three principal mountains in Hawaii, Mauna Kea in the N.E., Mauna Hualali in the N.W., and Mauna Loa in the South. As stated on a former page, they are active outlets of the subterranean fires which have formed the archipelago.

The general direction of this, parallel to the great mountain chains of America on the one hand, and nearly that of Kamtschatka, to which quarter it is directed, seems to indicate some general law in the structure of the earth, or that some fissures in the crust exist in this region of it.

Mauna Kea is less evidently an active volcano than the others. It consists almost entirely of scorice, without any apparent craters. It may be characterized as a vast mound, surmounted with nine cones, the southernmost of which is the highest. Perhaps these cones may be considered as craters. Although a sister mountain to Mauna Loa, it is of very different form and apparent composition. On its summit frosts prevail, and vegetation continues up to within 1,000 feet of its summit, and even higher. The plants also differ. Their height is singularly equal, not being more than 193 feet higher than the summit of Mauna Loa, or 13,953 feet, according to the measurement of Commodore Wilkes in 1841, which is 300 feet higher than previous estimates (13,645 feet).

Mauna Hualali, or *Huarari* (or Worroray, as it is called by Vancouver), although not of such gigantic proportions as the other two principal mountains, is yet very conspicuous. On its summit is a very extensive crater, which has been instrumental in wonderfully changing the surface of the surrounding country. Besides the central spiracle, hundreds of cone craters, or hills of scoriaceous lava, may be seen from its summit, like excrescences on its sides. Its height is given as 7,822 feet.

Mauna Loa was from Cook's first estimate considered to be one of the highest mountains in the world. Although his calculation was in excess, it is still to be ranked with the loftiest. Its form is unique, and has been increasing, and is perhaps entirely formed from the overflow of its terminal crater. Its form is that of an extensive flattened dome, falling very gradually on its northern and eastern sides. Its summit was ascended, and numerous observations made here by the U.S. Exploring Expedition, in 1841. The highest part of the edge of the summit crater was then found to be

13,760 feet above the sea. The crater is a most extensive one, and possesses all those wonderful characteristics which have been so frequently described. This is the principal spiracle of Hawaii, and its recent eruptions have been among the most violent on record, as described on page 825. This active volcano and its destructive effects renders this principal island in a great measure uninhabitable, and discourages any attempt at colonization.

The Kilauea or *Kiraneah Volcano* lies on the side, as it were, and to the S.E. of Mauna Loa. It is merely an immense crater, $3\frac{1}{2}$ miles long, $2\frac{1}{2}$ miles wide, and over 1,000 feet deep. The bottom in the daytime looks like a heap of smouldering ruins; what is wonderful in the day becomes ten times more so at night. The height of this singular volcano above the sea was found to be 3,970 feet. To the S.E. of it is a line of craters, from some of which a great eruption occurred May 31, 1840. Having thus described briefly and imperfectly these, the most wonderful features of the Pacific, we pass on to the coast, commencing with the S.E.

Kapoho Point is the easternmost projection of the island. The country is exceedingly fertile; sugar-cane grows here in abundance, coffee succeeds well, as do indigo and taccia, from which arrow-root is made. The coast to the N.W. is a precipitous shore, about 15 feet high, on which the sea beats with violence at all times. It is bestrewed with lava streams, apparently of old date. At 3 miles from the East point is *Puna*, where there is a large church, but no village, as the houses are much scattered. *Kanakiki*, a small village, is $1\frac{1}{2}$ mile from Puna, and 3 miles further is a spot where an extensive stream of lava enters the sea, called *Nanavalis*. Prior to the eruption in 1840 the coast was a continuous lava cliff; now the site is occupied by three sand-hills, formed by the lava stream, of very singular formation, the highest 250 feet. There is no appearance of shoal water opposite, though such was stated to be the case.

HILO, *Waiakea*, or *Byron's Bay*, is the first, indeed the only place of consequence, on this side of the island to the seaman. The bay has been variously named. Lord Byron calls it *Hido*, after the village in the bottom of the bay. Lieut. Malden calls it after another village, *Waiakea*; and the third is from the name of the British commander who first anchored here, but is not now thus known among the natives.

Hilo, the second town in population and commercial importance in the Hawaiian Islands, is situated on a beautiful bay of the same name, on the windward side of Hawaii. The bay of Hilo was formerly called *Waiakea*, and frequently *Byron's Bay*, but the present native name, being to the "manor born," and more appropriate, has by general consent superseded the others. It is in North lat. $19^{\circ} 45'$ and $155^{\circ} 6'$ West longitude from Greenwich. The anchorage is good and the harbour capacious. The crescent shore slopes to the water's edge, where it terminates in a regular sandy beach. The boat landing is excellent.

The population of Hilo proper at the last census, as near as can be ascertained, was 1750. Of this, the active business portion is composed of foreigners. The Americans are more numerous, about 75 in number, and there are many Chinese of the better class.

There are two substantial churches in Hilo. The Protestant church is large, indeed sufficiently commodious for the entire population of Hilo. The Roman Catholic church is also commodious, well constructed, and roofed with slate. It is finely situated, with its white towers and belfries, surmounted by two crosses directly in front of the harbour. There are several schools, stores, an iron foundry, and all other accessories of civilization.

The harbour of Hilo, with little expense, could be made one of the safest and most commodious in the Pacific. By constructing a breakwater on the reef, northward from the point beyond Waiakea, the harbour would be perfectly safe, land-locked, and sheltered at all times. This could be easily effected by building a tram railway, and by means of cars, which could transport the abundant hard, volcanic material near at hand, upon the reef. It is but a short distance to immense beds of basaltic, vitreous, and vesicular lava, which would resist the action of water for ages. The convict labour of the island would be sufficient to accomplish the work in a few years, and render Hilo a port where all the shipping of the Pacific could ride securely at anchor. It is now more capacious than any other bay or harbour on the island, and it is not subject to violent gales from any quarter.

There is a good watering-place up Waterfall Creek, within the mouth of the Waialuku River, which is generally easy of access, except when the wind is blowing hard from the north-eastward; on such occasions the surf is high, and the rocky bar at the entrance then becomes dangerous for boats to pass. The water is excellent and abundant.

The best landing-place is southward of Cocoa-nut Island, in the S.E. corner of the bay, but it is easy to land on the beach in proper boats.

Light.—In 1869 a lighthouse was erected on Paukaa Point, at the entrance. It shows a *fixed* white light, elevated 50 feet above the sea, and in clear weather should be seen from a distance of 10 miles. From the lighthouse, the outer point of the reef bears S.E. by E., the inner point of the reef S.E., Lelewi Point E. by S., and Makahanaloa Point N. $\frac{1}{2}$ W.

We have no directions in connection with this light, but it will be very serviceable.

The following directions are by Lieut. Malden:—

H.M.S. Blonde, as before stated, was the first man-of-war that ever entered this bay, and hence it was called after her commander. The western side runs nearly North and South, about 9 miles; the eastern E.N.E. and W.S.W., about one-third that distance. The anchorage, in 6 or 7 fathoms, stiff muddy bottom, is protected from the N.E., to which it is apparently

open, by a coral reef, half a mile in breadth, extending from the eastern point in a W.N.W. direction, two-thirds across the bay, leaving a channel three-quarters of a mile broad between it and the West shore, with 10 and 11 fathoms in it. When the wind blows strong, a heavy surf breaks upon the reef, but inside it is smooth. It is only exposed between N. to W. by N., from which quarter the wind never blows hard in summer, and but very rarely in the winter; only one northerly gale had been felt in two years. The surrounding scenery is the most beautiful in the Sandwich Islands, but the climate is wet, showers occurring daily. Watering is very readily done in the S.W. extremity of the bay.

In steering for the anchorage, with the sea-breeze, when about 3 miles from the bottom of the bay you will be outside the reef, in 25 to 30 fathoms. The West shore must then be kept close on board. The leading marks for the channel, to clear the West end of the *Blonde Reef*, are these:—Keep the huts on the West side of Waterfall Creek on with the eastern side of a remarkable green hill (an extinguished volcano), impossible to be mistaken, bearing by compass S.S.W. $\frac{1}{2}$ W., till the *Turret Rock* (about 15 feet high) bears W. by S. $\frac{1}{4}$ S., when you will be in 7 or 8 fathoms, stiff muddy bottom. The whole of the West coast is composed of cliffs, the huts standing upon the last and most southerly visible cliff. When upon the West extremity of the *Blonde Reef*, the above huts are in one with the western side of the green hill, bearing S. 29° W., by compass; and at the same time the centre of the same hill is on with the left of two very distant hummocks. These are frequently obscured by haze, or they would be the best marks. When at the North extreme of the reef a deep inlet, called *Cocoa-nut Cove*, in consequence of there being a group of these trees at the entrance, is quite open, bearing West by North. As there are no dangers in the channel, and it is more than three-quarters of a mile wide, there is quite room to beat any vessel out against the sea-breeze, and which, if it be fresh and steady, is preferable to running out at daylight with the land wind. The land wind frequently leaves you in the lurch, and you are obliged to come to in deep water, to prevent being driven upon the rocky cliffs of the West coast. Indeed, in turning out of the bay, with a good strong sea-breeze, as soon as you are to windward of the reef, she should keep beating to windward in a N.E. or N.E. by E. direction, not attempting to weather the North point of the bay (*Point Blonde*) until it can be done with certainty, at the distance of 5 or 6 miles at least; for, when at 3 or 4 miles to the North of *Cocoa-nut Cove*, there is no bottom with 50 fathoms, although within half a mile of shore. So that, should a vessel in this situation be becalmed, her state would be most dangerous, a heavy swell and current constantly setting against the precipitous cliffs. *Cocoa-nut Island* is in lat. 19° 43' 51" N., long. (East of *Karakakoa*) 0° 52' 50". Tide rises about 4 feet, high water at sunset, and low water at daylight, being influenced by the sea and land breezes.

Captain Wilkes remarks:—As respects the Bay of Hilo, I cannot but view it as a safe anchorage. We were detained there about three months, and never had a gale strong enough to ride our anchors, though these were the winter months, December, January, and February. At times, however, there was a considerable swell rolling in, so as to make it uncomfortable on board ship. The weather was not so rainy as was anticipated, and some most delightful weather was experienced in February.

The whole settlement forms a pretty cluster; the paths and roadsides are planted with pine-apples, and the soil covered with a rank vegetation. *Waiakea Point* is on the opposite side of the bay from Hilo, at rather more than a mile off; the path between leads along a sandy beach, on which the surf continually breaks, and at times with great violence.

"The scene which the island presents, as viewed from the anchorage in Hilo Bay, is both novel and splendid; the shores are studded with extensive groves of cocoa-nut and bread-fruit trees, interspersed with plantations of sugar-cane. Through these numerous streams are seen hurrying to the ocean; to this succeeds a belt of some miles in width, free from woods, but clothed in verdure; beyond is a wider belt of forest, whose trees, as they rise high from the sea, change their character from the vegetation of the tropics to that of the polar regions; and, above all, tower the snow-capped summits of the mountains."—(Wilkes, vol. iv. p. 110.)

Hilo, viewed from the harbour, presents much the same tropical appearance as other parts of the islands, and as a panoramic view it is not surpassed in beauty and grandeur of scenery by any other spot in the kingdom. There is a luxuriousness and freshness in the vegetation, a living green in the verdure and foliage, that combine to present an almost perfect picture. The crescent sweep of the bay, ending with the cluster of cocoa-nuts on the island, the towering heights of Mauna Kea behind, the majestic dome of Mauna Loa, all help to form a landscape scene seldom equalled.

The following remarks are by Mr. H. Thompson, R.N., master of H.M.S. *Talbot*, which was here in June, 1845:—

After a passage of eight days (from Honolulu) we arrived off Byron Bay, where we took on board a pilot, about 8 miles off shore. The sea-breeze gradually fell light as we entered within the limits of the bay, and continued to blow (but very feebly) just sufficient to give the ship steerage way; but the swell assisted the vessel in, when we anchored in 5 fathoms water, and afterwards moored with 70 fathoms on best bower to N.E., and 40 fathoms on small bower to S.W., with the following bearings, viz., Cocoa-nut Point E. by N. $\frac{1}{4}$ N., the thatched native chapel on with North side of Green Hill S.W., and Red Cliff Point N. $\frac{1}{4}$ W.

The anchorage in Byron Bay is open to all winds from North to E. by N., being only sheltered in that direction by an extensive sunken reef (Blonde Reef), on which the depth of water varies from 9 to 6 fathoms, and which

sufficiently breaks the sea to render a ship comparatively safe behind it. The pilot told me that during his residence (twenty years) here he had seen some very strong gales from the N.E., but had never known any vessel suffer by them; yet I am of opinion that on such occasions a vessel would find it very heavy riding, and should be provided with good ground tackle.

A ship of any size may anchor here in from 4 to 9 fathoms water.

There is seldom any difficulty experienced in entering this bay, as the sea-breeze blows right in, and should it be ever so light, with the assistance of the swell astern, and boats towing if necessary, the anchorage will be gained in safety. But the egress is not so easy; it is often attended with difficulty, and sometimes with risk. The channel between the reef and the shore is narrow, rather too much so to allow a square-rigged vessel to work through, unless she be a small one, and then it should be only with a commanding breeze.

To sail out of Byron Bay a vessel should start with the first of the land-breeze, which generally comes off soon after midnight, so as to get a good offing before it ceases, otherwise, if daylight is waited for, the land wind will seldom hold long enough to take a vessel sufficiently off shore to leave her in a safe position; and should the sea-breeze fail to blow home to the coast during the day, which not unfrequently happens, thereby leaving her exposed, helpless, to a heavy swell setting directly towards the reef, a vessel's own boats' towing would have but little effect against it. There is a deep-water anchorage outside the reef, and there is also anchorage in the channel in 10 to 12 fathoms; but both these anchorages are unsafe when blowing fresh.

The similarity of the coast and the want of remarkable objects in the vicinity of this bay, prevents me from describing any conspicuous marks that would guide a vessel to or from the anchorage. The general rule for approaching the anchorage is to close the land a little to the northward, and run down along shore rather within the distance of half a mile, which will lead a vessel a little inside the North extremity of the reef which forms the channel; this reef may be seen from a slight elevation above the deck. There is a long gulley running up the land in a southerly direction from Cocoa-nut Cove, which forms a good object to steer for when once made out, as it leads close to the entrance of the channel; it appears like a dark mark in the land, and there is nothing in that vicinity that resembles it.

The coast to the northward of Hilo is somewhat peculiar; it is a steep bluff, rising about 200 feet; this is cut into small breaks, called here "gulches," within which the villages are generally situated, and the natives grow bananas and taro. These gulches are ravines from 800 to 1,000 feet deep, which have been apparently worn by water-courses. There is no landing for boats, for all along the coast the surf beats on the rocks with great violence.

This *N.E. coast* of Hawaii, beyond Hilo Bay, is a lee shore, without shelter or anchorage. The coast is firm and compact, terminating generally in steep rocky cliffs, with a few small indented bays, rendered easily accessible to the native canoes by the sandy beaches that bound them. From these rugged rocky cliffs many streams of water fall, in cascades or otherwise, into the ocean.

Laupahoi is about 6 miles northward of Hilo. It is the great pulu depôt for this side of the mountain, and is a pleasant-looking hamlet, situated at the mouth of a deep ravine.

Captain Sir Edward Belcher approached these islands from the E.S.E. July 7, 1837, and passing within 3 or 4 miles of the breaker line, witnessed these numerous cascades resulting from the showers emanating from the heavy clouds which capped the summits of Maui and Hawaii. "No description can convey the idea of the number and variety of the silver threads which they exhibited; and a sketch, including twenty leaps within 100 or 200 yards, would appear almost a burlesque, yet such was the fact."

The southern portion of this section of the land has a very dreary aspect; Vancouver says it was perfectly uncultivated, and nearly destitute of habitations; those which are to be seen are small, and thinly scattered. Advancing to the N.W., the population and cultivation increase. At about 5 leagues from *Healakaka Point*, which is called by Vancouver the N.E. point, the coast is composed of a cluster of remarkably high, steep, rugged, and romantic cliffs, discharging from their naked summits many rapid cataracts into the ocean. The rushing of these impetuous torrents down the black, barren surface of the rocky cliffs, contrasted with the enchanting, cultivated, and populous country to the East and West, and behind this dreary frontier, for a considerable distance up the sides of the lofty mountains, on approaching them in the offing present a very beautiful and picturesque appearance. Nearly in the centre of these cliffs is a tolerably deep, small bay, off the *Waimanu Valley*, much resembling in appearance, and most other respects, the bay in the island of St. Helena; but it seems too much exposed to the sea and the prevalent wind to be an eligible place for shipping. At 8 miles to the westward of this bay, off the western extremity of these cliffs, lie some rocky islets, a little distance from the land.

Westward of these cliffs there are soundings off shore, as Vancouver found 7 fathoms at 2 miles off, the North (West) point bearing S. 70° W., 9 miles distant. The sea breaks with great violence near the shore at this part, and so continues all the way to the N.W. point of the island. There was a very heavy, confused, irregular sea, which was suspected to arise from a very sudden decrease in its depth, and the effects of a strong gale.

Upolu Point is the N.W. point of Hawaii. The land here falls in a gradual descent from the base of the mountains, and forms an extensive

plain towards the water side, which seemed to be in a high state of cultivation, and abounds with native houses.

The *Kohala district* lies on the North point of Hawaii, and is divided from that of Waimea by a range of mountains. The soil on the leeward shore is barren from 3 to 5 miles inland. On the windward shore it is of good quality quite to the beach. The face of the country is regular, gradually ascending from the coast to the summit of the high lands. Kohala is the principal place in the district.

There are soundings off the coast to the southward of Upolu Point. Vancouver anchored here about 7 miles from the point, in 41 fathoms, but drove off the bank in the night with a gust of wind from the land. On this account it is objectionable; it is exposed to the North winds, which, with those that blow from the N.W., are the most violent and dangerous known in this country.

Kawaihae Bay, *Towaihai*, *Toeaigh* (Vancouver), or *Tee-yah-yah* (King), is 16 miles South of Upolu Point. Captain King says this extensive bay is bounded to the North by two very conspicuous hills. Towards the bottom of the bay there is foul corally ground, the soundings are regular, with good anchorage in 20 fathoms. Captain Wilkes says of this part:—The district of Waimea is situated on the N.W. side of the island. So much of the soil of this district as lies along the coast, though rich, is badly watered, and 7 or 8 miles in the interior from Kawaihae Bay, it becomes exceedingly rocky and barren. The high land to the eastward of Kawaihae causes almost a perpetual calm. The mountain region is rocky, and has a burnt appearance, until the eastern side of the mountain is reached, when a dense forest and a most luxuriant vegetation succeed. The climate of this district is, upon the whole, unpleasant, particularly at Waimea, in consequence of the trade-wind, which is exceedingly strong, bringing with it a mist towards sunset. This wind rushes furiously down between the mountains which bound the valley of Waimea, and becomes very dangerous to shipping in the bay. It is called by the natives "Mumuku," and is foretold by them from an illuminated streak that is seen far inland. This is believed to be caused by the reflection of the twilight on the mist that always accompanies the Mumuku.

The productions of Waimea are the same as those of the other districts, but it also abounds in timber of good size and quality for building. This was the famous sandal-wood district, whence Kamehameha (the king) procured the cargoes he sold for the Canton market. There are no trees left now larger than mere saplings. Waimea was also the principal place of export for hides, tallow, and beef. Of these articles only a small amount is now exported, owing to the tabu on cattle.

Light.—A fixed white light is now exhibited as a guide to the anchorage

of Kawaihae, elevated about 50 feet above the sea, and in clear weather should be seen from a distance of 10 miles.

From the N.E. corner of the reef the light bears N.E. by N. $\frac{1}{2}$ N. ; with the light bearing E.N.E. there is good anchorage about a quarter of a mile from the shore.

Vancouver anchored in this bay February 14, 1793, and again on February 28, 1794, in 25 fathoms, on a bottom of fine brown sand and mud in the first visit, and on a stiff clay and good holding-ground on the second, the points of the bay bearing N. 36° W. and S. 31° W. ; the Morai, which is also conspicuous in pointing out the station, N. 68° E. ; and the watering-place at the distance of about $1\frac{1}{2}$ mile, being the nearest shore, S. 79° E. The Morai is a conspicuous object, and a good leading mark into the anchorage ; it stands on a barren eminence to the southward of the village, and is to be kept on a line with a small saddle hill, on the eastern land, descending from the higher parts, over the village of Toeaigh, on the North side of the bay. Its South point, descending gradually from Hualalāi, and forming a low point, bore by compass S. 31° W. ; within this point, on the rising land, are some elevated hummocks ; the third of these, from the point forming a kind of saddle hill in a line with a low, projecting, black, rocky point, in the middle of the bay, bearing S. 22° W., is a further direction, and a cross mark for this anchorage. On sounding round the ship, about a fourth of a mile to the S.W., a very small patch of coral rocks was found, where the water was only 10 fathoms in depth, but increased suddenly to 20 fathoms all around it. This was afterwards found to have only 3 fathoms in one part. On the opposite side, however, was clear, good anchorage for about a mile, where many vessels might ride without inconvenience from the bottom, though nevertheless exposed to the violence of the winds and sea between the limits above mentioned, comprehending 113° in the western quarter.

The shoal is a very great inconvenience to the roadstead, which is at best but a very indifferent one, being entirely exposed to the N.W. winds and the western oceanic swell, which beats with great violence on the reefs encompassing the shores. The only advantageous circumstances are the run of water, which, however, does not always flow, and the probability of procuring refreshments, from its contiguity to the populous and fertile western part of the Koarra district, and the plains of Waimea lying behind the land constituting the sea-coast.

The watering-place is in a small sandy bay, where, over a space of 20 yards of rugged rocks and stones, a fine stream empties itself, whose water is easily to be procured by landing the casks on the sandy beach, and having the water brought in smaller vessels to fill them, a service in which the natives would be useful.

Vancouver says :—" Toeaigh (Kawaihae) is situated in a grove of cocoa-

nut trees, just behind a sandy point. A reef of coral rocks, extending thence about three-quarters of a mile into the sea, rendered it inaccessible to our boats in a direct line, but we landed very commodiously in a narrow channel between the reef and the shore, near the Morai, to the S.E. of the beach. The village only consisted of straggling houses; in the centre of them was a reservoir of salt water, from which salt was made."

From the bottom of the bay the coast extends for about 28 miles in an irregular S.W. direction to the westernmost point of Hawaii, *Kaulano Point*. It does not appear to afford any shelter or interest to the mariner.

The great lava stream which flowed from the summit of Mauna Loa in January—July, 1869, reached the sea about 15 miles to the S.W. of Kawaihae, and considerably altered the features of the coast.

The S.W. side of the island is termed the district of *Kona* (or *Akona*), and includes Kealahakua and Kairua or Kailau.

The district of Kailau is similar in character to that of Kealahakua, but the lava is of a more recent formation, the eruptions from Mauna Hualalai having flowed down and covered nearly the whole northern portion. This eruption happened in 1809 and 1810. The mountain is 7,822 feet high, and rises abruptly on its West side.

This being the lee side of the island, as explained in a former passage, rain very seldom falls here, and this, with the absence of all dew, does not allow of much cultivation. There is coarse herbage enough for slight pasturage near the shore, but further inland it becomes better, and the taro and bread-fruit are abundant. Land and sea breezes are very regular, and are the prevalent winds.

Kailua, *Kairua*, or, as it is called by Vancouver, *Tyachtatooa Bay*, is in this district, 9 miles from the West point. In Meares's account of Captain Douglas's voyage this bay is considered equal or superior to that of Kealahakua, but Vancouver's closer examination led him to a different conclusion. It is but a slight bend in the general line of coast, not more than 2 cables' lengths in depth, according to Captain Duperrey's chart, and scarcely deserving the name of a bay. Vancouver anchored with the northernmost point bearing N. 69° W., by compass; the village, called Ane-oo-rooa, being the nearest shore, N. 30° E., about half a mile distant, and the point of Kowrooa (Kolui), S. 22° E. This was as close to the shore as prudence would allow them to lie, and the bottom in all directions appeared to consist of a mixture of rocks and sand. A considerable swell rolled in from westward, and by the beaten appearance of the rocks that chiefly compose the shore, this seemed to be in general the case, and for that reason not a very eligible place for shipping. It has, however, one superiority over Kealahakua in respect of landing. This convenience is produced by the jutting out of two points; between these is a small cove, defended by some rocks lying before it, which break the violence of the surf, and render communi-

ation with the shore very commodious. The landing is on a sandy beach, before a grove of cocoa-nut, bread-fruit, and other trees, in the midst of which the village is situated. On a point on the West side is the tomb of King Kamehameha, which is placed by Duperrey in lat. $19^{\circ} 37' 20''$ N., long. $156^{\circ} 1'$ W. Toward the South part of this cove is a spring, which rose very rapidly from amongst some rocks that are generally covered with the sea water; but when this is low, which is sometimes the case, it is found to produce a stream of excellent fresh water; by proper means there is no doubt but that it might be made available for the neighbourhood and shipping. Wilkes says that this place had thriven greatly from the industry encouraged by the native governor of Hawaii.

The next district, or rather portion of the district of Kona, is that of Kealakekua, or Karakakooa, which lies to the southern end of the preceding. Wilkes describes it thus:—"Almost the whole coast of this district, extending 40 miles, is one line of lava. This frequently lies in large masses for miles in extent, and is in others partially broken, exhibiting perpendicular cliffs, against which the sea dashes with fury. This formation extends half a mile into the interior, and as the distance from the sea increases, the soil becomes richer and more productive. The face of the country, even within this rocky barrier, is rough, and covered with blocks and beds of lava, more or less decomposed. The land in places reaches the altitude of 2,000 feet, and at the distance of 2 miles from the coast begins to be well covered with woods of various kinds of trees, which are almost rendered impassable by an undergrowth of vines and ferns. In these woods there are many cleared spots, which have the appearance of having been formerly cultivated, or having been burnt by the descending streams of lava. In some places these strips of wood descend to within a mile of the shore, having escaped destruction. These are in no place parallel to the shore, but lie always in the direction which the streams of lava would take in descending from the mountains. Cultivation is carried on, and might be increased, notwithstanding the great difficulties. The only staple commodities at present are sweet potatoes, upland taro, and yams; the latter almost entirely raised for ships."

The climate is mild throughout the district, and there are seldom strong winds. From May to September, the wet or rainy season, there is a good deal of rain. In December, January, and February, the weather is usually very dry, and the winds prevail from the North, from which quarter it sometimes blows fresh.

Kealakekua or Karakakooa Bay, derived a sad celebrity from its being the scene of the death of the immortal Cook, the discoverer of the group, and the father of modern hydrography.

The following is Captain King's description of it;—"It is about a mile in depth, and bounded by two low points of land at the distance of half a

league, and bearing S.S.E. and N.N.W. from each other. On the North point, which is flat and barren, stands the village of Kowrowra; and in the bottom of the bay, near a grove of tall cocoa-nut trees, there is another village of more considerable size, called Kakooa; between them runs a high rocky cliff, inaccessible from the sea-shore. On the South side the coast, for about a mile inland, has a rugged appearance; beyond which the country rises with a gradual ascent, and is overspread with cultivated enclosures and groves of cocoa-nut trees, where the habitations of the natives are scattered in great numbers. The shore all round the bay is covered with a black coral rock, which makes the landing very dangerous in rough weather; except at the village of Kakooa, where there is a fine sandy beach, with a morai, or burying-place, at one extremity, and a small well of fresh water at the other. This bay appearing to Captain Cook a proper place to refit the ships and lay in an additional supply of water and provisions, we moored on the North side, about a quarter of a mile from the shore, Kowrowra bearing N.W."

The last words of the illustrious circumnavigator's journal refer to this place:—

"At 11 a.m. (Sunday, January 17, 1779) we anchored in the bay (which is called by the natives *Karakakooa*), in 13 fathoms water, over a sandy bottom and about a quarter of a mile from the N.E. shore. In this situation the South point of the bay bore South by West, and the North point West $\frac{1}{4}$ North. We moored with the stream anchor and cable to the northward, unbent the sails, and struck the yards and topmast. The ships continued to be much crowded with natives, and were surrounded by a multitude of canoes. I had nowhere in the course of my voyages seen so numerous a body of people assembled at one place; for, besides those who had come off to us in canoes, all the shore of the bay was covered with spectators, and many hundreds were swimming round the ship like shoals of fish. We could not but be struck with the singularity of this scene; and perhaps there were few on board who now lamented our having failed in our endeavours to find a northern passage homeward last summer. To this disappointment we owed our having it in our power to revisit the Sandwich Islands, and to enrich our voyage with a discovery which, though the last, seemed in many respects to be the most important that had been made by Europeans throughout the extent of the Pacific Ocean." The subsequent proceedings of the discovery ships are familiar to all. Captain Cook on his landing was received by the natives in a most extraordinary manner. He received unmistakable evidences of adoration addressed to him, and several religious ceremonies occurred, in which he was the principal object. The most unbounded liberality was also shown to the visitors, and all was friendly and respectful. The ships quitted the bay on the 4th of February, but on springing the foremast they determined to return, and reached their former anchorage on the 11th fol-

lowing. Their reception was the reverse of what was anticipated, and suspicion and aggression in small matters took the place of the former good feeling. This led to open outbreak, and on Sunday, February 14, 1779, Cook landed with a boat's crew, in the midst of an immense and armed crowd. A chief had been unfortunately shot, and the news arriving, was the signal for open warfare, and Cook was stabbed in the back in attempting to reach the boat at the water's edge. Thus died the most remarkable man at the scene of his most important discovery. The stone on which he landed is still shown, and the stem of a tree, near to the spot where he fell, is now marked with an inscription on copper relating the fact. The top of this tree has been brought to England, and deposited at Greenwich hospital.*

The name of the bay, Karakakooa, as Cook calls it, or Kealakekua, according to the missionary orthography, signifies "the path of the gods," and is so termed from a slide in the hill, still visible, by which the natives believed the gods used to cross the bay quickly.

The bay is not extensive, and opens between two low and barren hills, on each of which stands a town. Between them a high perpendicular bluff rises directly from the water, in which are numerous caves formerly and still sometimes used as places of burial. These caves are nearly inaccessible, and resorted to by vast flocks of birds.

The district of *Kau* occupies the southern extremity of the island. The coast, says Captain King, presents a prospect of the most horrid and dreary kind, the whole country appearing to have undergone a total change from the effects of some dreadful convulsion. The ground is everywhere covered with cinders, and intersected in many places with black streaks, which seem to mark the course of a lava which has flown, not many ages back, from the mountain Roa to the shore. The southern promontory looks like the mere dregs of a volcano. The projecting headland is composed of broken and

* The fate of Cook is a sad evidence of an unfortunate point in his personal character. His temper was overbearing and hasty, and for this his attached friend and companion, Captain King, remarks, he might have been justly blamed. No other navigator ever experienced such a welcome. He was the god to them which tradition led them to expect to return, and *Lono* (O-rono), as he was called, received divine honours and unbounded liberality. Unfortunately they did not meet with due consideration, and he who was considered immortal was killed. All his remains were not returned at the time, but his ribs and breast-bone, as also a sledge from the N.W. coast of America, were afterwards worshipped by those who believed in his divinity. They were preserved in a small wicker basket, covered with red feathers, and deposited in a temple dedicated to *Lono*, on the East side of the island. They were annually carried in procession to other parts of the island. Their fate has never been properly ascertained, but it is said that some of them were brought to England by *Liho-Liho*. The remainder have probably been hidden since idolatry was abolished.

craggy rocks, piled irregularly on one another, and terminating in sharp points.

Notwithstanding the dismal aspect of this part of the island, it is much more populous than the verdant mountains of Puna to the N.E. Nor is this circumstance hard to be accounted for; the natives prefer such ground as lies more convenient for fishing, or is best suited to the cultivation of yams, and plantains. Now, amid these ruins there are many patches of rich soil, which are carefully cultivated, and the neighbouring sea abounds with excellent fish. Another inducement for their residence here is that it is the *fungus district*, where this vegetable production is collected and dried for the China market, and is sent to Honolulu for shipment in large bales. Off this part of the coast Captain King could find no ground at less than a cable's length off the shore, with 160 fathoms of line, excepting in a bight to the eastward of the South point, where they had regular soundings of 50 and 58 fathoms over a bottom of fine sand.

The **South Point** is in lat. $18^{\circ} 54'$, long. $155^{\circ} 39'$, and on it stands a tolerably large village. After Cook's visit it was reported that good anchorage and excellent shelter existed close round on the western side of this South point, and had been overlooked by that navigator; but Vancouver, to set the matter at rest, examined it, and found that the shores were nearly straight, and exposed to a most tremendous surf, that broke with such fury as to render landing, if not impossible, highly dangerous, even to those inhabitants who are most expert in the management of their canoes.

The whole of the S.E. side between the South point and Kapoho Point, a distance of 65 miles, affords not the smallest shelter or anchorage of any description.

All this part of the island has been much altered by the effects of the volcano which stands over it.*

MAUI or *Mowee* of the older navigators, is the next large island to the

* The southern extremity of Hawaii suffered most from the great eruption of Mauna Loa, of 1868, alluded to on page 825. It commenced, with but few warnings, on March 27th, and from that period to April 10th it was estimated that *two thousand* shocks were felt, the heaviest on April 2nd, which was felt in Honolulu, and destroyed every church and dwelling in the Kau or southern district of Hawaii. On April 7th, a new crater suddenly burst out on the side of the mountain, near a house which was covered with lava, *ten minutes* afterwards, and from it a river of fire, varying from 500 to 1,200 or 1,500 feet wide, ran southward at the rate of ten miles an hour. This lava stream reached the S. point, and the *Kona* packet, passing this point at the time, it is said at three miles distance (probably exaggerated), saw a conical island, 400 feet high, rise out of the sea midway between the land and the vessel, the mud bespattering her sails. The lava flowed down to this island, so that it now joins the land. The whole of this Kau district was desolated, and much loss of life ensued, so that it is now deserted.

N.W. At a distance it appears like two islands, but a nearer approach shows the low isthmus only a few feet above the sea, and 9 miles across, uniting the two peninsulas. The whole island, like all the rest of the group is volcanic, and appears to have been produced by the two adjacent volcanoes, which have ejected the enormous masses of matter of which it is composed. The island resembles Tahiti more than Hawaii does, both in form and appearance. The lofty summits of the southern peninsula are never covered with snow, though they are often seen above the clouds. The high land is steep and rugged, showing at all times the igneous nature of its formation, extinct craters and indurated lava streams. Where this has decomposed, the sides of the mountains are covered with shrubs and trees.

The surface of the northern peninsula does not appear to be of such recent formation as that of the southern, and although it is of evident volcanic formation, the marks of recent eruption are seldom seen.

The aspect of the two portions of Maui are very distinct from each other. East Maui chiefly consists of Mauna Haleakala, which from perpendicular cliffs near the sea, rises in many parts with one unbroken slope to the summit. West Maui is very much intersected by sharp peaks and ridges, separated by deep valleys which form sloping plains of considerable extent to the northwards and southwards. The highest peak of West Maui is *Mauna o Ekeka*, 6,130 feet high, and the greater part of this peninsula is grazing land.

East Maui, though mountainous, has most cultivated land, and the rich volcanic soil of the Kula District on the S.W. side of the island raises abundant crops of potatoes, which are sent to supply the whalers' and other ships. Wheat and other grain is also cultivated, and increasing.

The South point of Maui, *Cape Kahiki*, is formed by rugged, craggy rocks, and the sea breaks at a little distance to the N.W. of it. The edge of this bank is very steep-to, suddenly shoaling from no bottom with 80 fathoms to 25 fathoms, and then to 10 fathoms. The South side of the island terminates very abruptly in the ocean, and, though rugged, is verdant and fertile.

The North coast of East Maui is a succession of deep ravines, running up the mountains and down them cascades, several hundred feet in height, but with little volume of water, are to be seen falling. In this respect it resembles the windward side of Hawaii. This circumstance renders travelling along the coast impossible. The central mountain is named *Mauna Haleakala* ("house of the sun"), and somewhat resembles Mauna Kea, on Hawaii.

Mauna Haleakala has the largest known crater, or it may be that it is formed of several craters. The mountain is 10,200 feet high, and the crater measures 12 miles around its edges, and is 2 miles across its widest part. The summit is bare. At the height of 8,000 feet there is a large cayorn. Capt.

Wilkes says :—"The crater of Haleakala, if so it may be called, is a deep gorge, open at the North and East, forming a kind of elbow ; the bottom of it, as ascertained by the barometer, was 2,783 feet below the summit peak, and 2,783 feet below the wall. Although its sides are steep, yet a descent is practicable at almost any part of it. The inside of the crater was entirely bare of vegetation, and from its bottom arose some large hills of scoria and sand. Some of the latter are of an ochre-red colour at the summit, with small craters in the centre. All bore the appearance of volcanic action, but the natives have no tradition of an eruption."

The isthmus is, as before stated, very low, and consists of sand constantly shifting, and thrown up into "dunes." It is too dry for cultivation, and is about 20 by 15 miles in extent. For nine months of the year it is a fine grazing country, and feeds large herds of cattle.

The East end of West Maui is an abrupt precipice, several hundred feet high on the coast. On the S.E. part of it is a female seminary, of some celebrity, called *Wailuku*. It is an extensive range of coral and adobe buildings in a flourishing village, and is one of the best organised establishments in the Sandwich Islands. We have no nautical particulars of the northern portions of Maui.

Lahaina lies on the S.W. side of West Maui. It was for a considerable time the residence of the king. After Kamehameha had conquered the group in 1795, the year after Vancouver's visit, he removed the seat of government to Honolulu, Oahu ; but his successor found this too troublesome a site from the importunities and assumptions of the white residents and white visitors. Lahaina was therefore selected as the most central position of the archipelago. The first missionaries were planted here in May, 1823.

The town of Lahaina is built along the beach for a distance of three-quarters of a mile ; it is principally composed of grass houses, situated as near the beach as possible ; it has one principal street, with a few others running at right angles. After the governor's (or king's) palace the fort is the most prominent object ; its form is quadrangular, the longest side facing the sea ; it is of little account, however, as a defence, serving chiefly to confine unruly subjects and sailors in. The area within is about an acre, and the walls are 20 feet high. According to the observations of the United States' Exploring Expedition, it is in lat. $20^{\circ} 51' 50''$, long. $156^{\circ} 41' 0''$. The tide here is irregular, being somewhat dependent on the winds ; it runs to the N.W. generally, sixteen hours out of the twenty-four.

The seminary of Lahainaluna is the most remarkable building to be seen as the bay is approached. It stands on the side of the mountain behind the town, and 2 miles from it. It was founded in 1831, for instructing school-teachers, but its system has since then been changed, and it is not so effective. An excellent chart of the Sandwich Islands was engraved on small pieces of

copper taken from a wreck at this establishment, a singular production for this remote spot.

Lahaina is in some points a preferable place to Honolulu for refreshment; more order reigns here than in most places in the Pacific; and the absence of foreigners and their attendant grog-shops, causes less temptation to be thrown in the way of crews ashore. Provisions, especially potatoes, are abundant.

Lahaina has been and still is a favourite recruiting place for the whale ships, and consequently the products of the other islands are brought here, and everything may be got here except taro. The fruits are excellent. There are several European residents and traders. The island seems to be rising as the beach is extending, having advanced at least 20 ft. since 1855.

Light.—A bright fixed light is shown on the beach, visible 6 miles off. Lat. $20^{\circ} 53' N.$, long. $156^{\circ} 35' W.$

Notwithstanding that the anchorage on this side of Maui is well sheltered, Vancouver considered that the bottom was only a slight covering of sand over a bed of hard coral. The lead does not discover this, but on anchoring the deceitfulness of the bottom is manifest. The roadstead of Lahaina is only an open one; the shores are bounded by a reef, with only one landing for boats. The soundings decrease regularly to 5 fathoms close to the reef, extending in general about one-fourth of a mile from the beach. The West extremity of Maui forms, with the West point of the roadstead bearing N. $14^{\circ} W.$ and S. $14^{\circ} E.$, a league asunder, an excellent little bay. The North point is formed by a round hill close to the water side.

The southern side of West Maui has a forbidding aspect; the shores, however, are not so steep and rocky as elsewhere, and have generally a sandy beach. There is a roadstead here called by Vancouver *Patoa*, which is represented as good anchorage, and may be easily found by attending to the following description:—The large bay, formed by the two peninsulas and the sandy isthmus, has its western side formed by high rocky precipices, that rise perpendicularly from the sea. To the westward of these precipices the coast is chiefly composed of sandy beaches, and the mountains, at some distance from the shore, form two remarkable valleys, separated from each other by a high rugged mountain, seemingly detached from the rest, and approaching nearer to the beach than those to the right and left of it. The anchorage at Patoa is abreast of the easternmost of these valleys, which appeared fruitful and well cultivated.

The western side of this large bay (*Kamalaea Bay*) is formed by rocky cliffs and precipices; its opposite shore is about 4 miles distant; the soundings on the eastern side are regular, but very rocky. Nearly in the middle of its western side is a village, called Mackerrey by Vancouver, off which there is anchorage in 7 fathoms water, a little more than a quarter of a mile off shore, bottom of sand and broken coral. It is only open to about two

points to the S.W., but there is not much wind from that quarter; one great inconvenience attending the anchoring in any part of this bay is the violent squalls which blow over the isthmus. These gusts, or rather gales of wind, blow constantly when the trade wind blows fresh at sea, and especially when it is most from the northern quarter. At these times it prevents any communication with the shore, and this is the more serious, as the holding ground is treacherous.

Another anchoring place will be found near the S.W. point of East Maui, a little to the southward of a remarkable round hill on a sandy beach, projecting its rocky base into the sea. From the appearance of its summit it was called Volcano Hill, and lies N. 26° W. about a league from the South point of Maui, and directly opposite the Island of Molokini. The soundings are regular, from 7 to 15 and 25 fathoms. The beach appears convenient for landing on, but there is no water.

MOLOKINI (or *Morokini*), or *Morrotinnee*, is a barren rock which lies between Tahaurawe and Maui. It is high, or it would be dangerous to shipping. It is only visited by fishermen, who dry their nets on its barren surface. It lies in the strait separating Kahoolawe from East Maui.

KAHULAU (*Kahoolawe*, *Tahaurawe*, *Tahoorowa*, or *Kadoolawe*) lies off the S.W. point of Maui, and from its shape and appearance seems as if it once formed a part of that island, and had been detached by some convulsion. It is low, and almost destitute of every kind of verdure or shrub, excepting a species of coarse grass. There are no evidences of active volcanic agency.

It is 14 miles long and 5 miles wide. It is only inhabited at times by a few poor fishermen, and was used as a place of exile. It is now chiefly useful as a sheep pasture. The whole South part is covered with a light soil, consisting of decomposed lava, and destitute of vegetation. On the North side there is a better soil, capable in some places of vegetation. There are one or two houses on the North end. Off the West point of the island, *Cape Kealaikahiki*, is a detached shoal, seen by Cook in his discovery of the island, February 24, 1779. It lies $1\frac{1}{2}$ miles off the point, and has 9 feet water on it. Vessels may pass safely within 2 miles of the point, but it will be much better not to approach within 3 miles. This shoal is remarkable as the only one hidden from the navigator around the Sandwich Islands.

LANAI or *Ranai* lies to the West of West Maui, 20 miles to the N.W. of Kahoolawe; the space between is called the *Auau Channel*. Lanai is a dome-shaped island. It is higher than Kahulau, but is neither so high nor broken as any of the other islands. The greater portion of it is barren, and the island in general suffers from the long droughts which frequently prevail; the ravines and glens, notwithstanding, are filled with thickets of small trees, which serve useful building purposes to the natives of Maui. The island, like the rest of the group, is volcanic; the soil is hollow, and by no

means fertile; the shores abound with shell-fish, medusæ, and cuttle-fish. The inhabitants are not numerous, about 400 in number. It is about 15 miles long and 6 miles broad. The country to the South is high and craggy; it appears to have been frequently rent, large fissures being apparent on its sides. The other parts of the island have a better aspect.

MOLOKAI or *Morotoi* lies to the N.W. of the preceding, and is of a different figure. It is a long, irregular island, apparently formed by a chain of volcanic mountains, 40 miles in length, and not more than 7 to 9 miles broad. The mountains are nearly equal in elevation to those of Maui, and are broken by numerous deep ravines and water-courses, the sides of which are frequently clothed with verdure, and ornamented with shrubs and trees. There is but little level land in Molokai, and consequently but few plantations; several spots, however, are fertile, and repay the toils of their cultivators.

One-third of the island to the West is a barren waste, and has but few inhabitants. The remainder, to the East, is almost one entire mountain, rising gradually from the South to the height of 2,500 feet; while to the North it is almost perpendicular. On the South side there is a narrow strip of land, not exceeding one-fourth of a mile wide, the soil of which is very rich, and which contains the greater part of the population. The soil here, however, is too dry for cultivation, which is carried on in the uplands. The people are very poor, and ill-provided with necessaries. In 1832 their number was 6,000; in 1840 only 5,000, and this was reduced to 2,300 in 1866; at the first named period it was first occupied as a missionary station.

There are several small harbours within the reef on the South side, at *Kaluaaka*, the missionary station, which are capable of sheltering vessels of from 60 to 80 tons.

Sir Edward Belcher, R.N., says:—Passing the East end of Maui, and coming suddenly on Molokai, the view is very singular; four exactly parallel outlines of picturesque and lofty cliffs appear almost a visual deception, or the effect of quadruple refraction; but on advancing it will prove to be a reality; height about 400 feet, and varying but slightly from the perpendicular. Here, also, as on Maui, several very pretty but loftier cascades embellish the scenery, which attired in nature's clothing only, is rich in colours.

The East point of the island is called *Halawa Point*; and half a league South of it is a small, barren, rocky islet, called *Moduenete*; and from this point the shores of the island lie S. 53° W. Off the N.W. end of the island a small bay was observed by Cook; but it was found by Vancouver that the space indicated was nearly a straight shore, composed alternately of rugged rocks and sandy beaches. He anchored in 19 fathoms, within about a mile of the breakers, on a fine sandy bottom; the West point of the island bore South by compass, distant 4 miles, and the N.W. point N. 26° E. about the

same distance. This was as close as safety would allow, but it is entirely exposed to the North and N.W. winds, which frequently blow with great violence, and to the very heavy roll of the sea.

OAHU, or *Woahoo*, the next island in succession, may be looked on as the principal of the group, as regards maritime affairs, inasmuch as it contains the port chiefly frequented by the shipping of the North Pacific. The island is 40 miles long by about 20 miles broad. Like the rest of the islands it is of volcanic formation; Captain Cook only saw the North or *windward* side, and, judging from this alone, it appeared to him to be by far the finest island of the group. Nothing could exceed the verdure of the hills, the variety of wood and lawn, and rich cultivated valleys, which the whole face of the country displayed. A different conclusion was arrived at by Captain Wilkes, who came first upon the lee side. The appearance of Oahu is by no means inviting; it has a greater resemblance to the desert coast of Peru than any other of the Polynesian islands we had visited, and has as little appearance of cultivation. The country, at first sight, would be termed barren and rocky. There could not be a better example of perfectly opposite characters applied to the same place than this, nor a better evidence of the great variation in climate which may occur within a very short distance. But whatever may be said of the unpromising appearance of its southern side, there is no doubt but that it is the garden of the Sandwich Islands.

The East end of the island is called *Cape Makapua*. There are numerous caves here, situated in a bluff of 300 feet elevation, and the mouths of them are at about two-thirds the height. They have been, and are still sometimes used as burial-places. They are the effect of volcanic action. At 12 miles from this point is the peninsula of *Mokapu*, which forms the harbour of *Waialai*. The entrance of this has only 9 feet water, a depth only fitting for the island vessels. Opposite to it inland is *Kaneote*, the mission station for the North side of the island, in the district of Pali Kulau. This district contains about 4,500 inhabitants, and the productions are similar to the island generally. Sugar and coffee are beginning to be raised. There is a belt of arable land extending along this district, which increases in breadth to the westward. This narrow strip of land, varying from half a mile to 2 miles in width towards the North end, is called the Kulauloa district. It is bounded by the mountain chain of Konohaunui. This belt is only a few feet above the sea. From its position on the island it receives abundance of rain for agricultural purposes. There are several small streams, which will drive the machinery for sugar-mills. The scenery of this part is most enchanting for beauty, boldness, and variety; stupendous precipices, rising some 2,000 or 3,000 feet, with numerous small streams gushing down their sides.

The district of Waialua stretches from the most westerly Cape of Oahu, called Kaena, to Waimea, in the district of Kulauloa, on the N.E., and to Waianae, on the S.W., a distance along the coast of above 20 miles. With-

in this district are a few bays for vessels not exceeding 150 tons burthen; the best of these is Kawailoa. Those to the N.E. are Waimea, Haula, Kakaua, Moluili, and Makua. Part of this district produces abundantly, being cultivated by irrigation. Five considerable streams water it from the Kona-haunui range, passing down the fertile valleys.

As just stated, the sugar-cane has been increasingly cultivated. The following notes were made on a visit to them in 1865:—

Passing by the two plantations in Nuuanu Valley, located within sight of Honolulu, we reached the *pali* (or cliff) over a good dry road, which here is seldom found in winter, and encountering a cool bracing North wind, which came rushing through the narrow gap and down the valley as if it had been caged up an hour or two by the encircling mountains. What a scene opens here to the traveller, as he commences the descent of the precipice—a plain 25 miles long, intersected with ridges of low hills, and hemmed in on the *mauka* side by bold paliades, in some places two thousand feet perpendicular.

Once down the *pali*, the traveller finds himself in Koolau, which embraces all the windward side of this island, East of the summit ridge, and extending from Waimanalo at the South to Waimea at the North, a track about fifty miles in length, and varying from 1 to 5 miles in width. All this district of Koolau is exposed to frequent showers, and is intersected with numerous small streams—all which tend to make it valuable for agriculture and pasturage.

Between the foot of the *pali* and the Protestant church at *Kaneohe* lies the sugar estate of the Queen Dowager Kalama, where Mr. Robert Wakeman has been engaged for some years in breaking up the land, planting and cultivating cane. About two hundred acres were planted, in various stages of growth.

Just beyond Kaneohe is a tract of three thousand acres, called *Heeia*, where the Catholic church is located, which is probably well calculated for a sugar plantation; at least cane grows freely there.

Beyond is the *Kaalaea* plantation, extending from the sea back to the central mountain range. The estate comprises some two thousand acres, eight hundred acres of it being suitable for cane. About two hundred acres are already planted.

Three or four miles beyond Kaalaea, we come to the *Kuoloa* estate, now called the "Oahu Plantation." Including Kaawa, it consists of about four thousand acres.

Like much of the land on this side of Oahu, the cane fields here consist of rich bottom-land, lying just above the level of high tide. So near the surface is the water, that the roots of the cane find moisture all the year round, reducing the risk of drought very much. The soil, like that of Lahaina,

Waikapu, and Wailuku, receives its deposits of rich alluvium from the mountains in the rear.

Waimea or Whynea Bay, as Captain King calls it, was visited by the *Resolution* and *Discovery* in February, 1779; they anchored in 13 fathoms, sandy bottom, the extreme points of the bay bearing S.W. by W. $\frac{1}{2}$ W. and N.E. by E. $\frac{3}{4}$ E., off the mouth of a fine river, running through a deep valley. Watering here, however, could not be well effected on account of a reef which stretches along shore to the distance of half a mile.

At *Kawailoa* the coast forms a small bay, and has a dreary aspect on first landing. The soil is sandy and poor, and the people have a squalid and miserable appearance, but at a short distance inland a great and pleasing change is seen. It was near here that Mr. Gooch, the astronomer to Vancouver's expedition, and Lieutenant Hergest, were killed by the natives.

Kaena Point is the western cape of Oahu and the southern limit of Waimea Bay. From it the western coast of Oahu trends S. 25° E. 20 miles, to the S.W. point, or *Waimanolo Point*. It is composed principally of steep, craggy mountains, some descending abruptly into the sea, others terminating at a small distance from it, whence a low border of land extends to the sea shore, formed by sandy beaches, chiefly bounded by rocks, over which the surf beats with great violence. Vancouver says, nearly in the middle of this side of the island is the only village we had seen westward of Opooroah (the Pearl lagoon). In its neighbourhood the bases of the mountains retire farther from the shore, and a narrow fertile valley winds through the hills. The shore here forms a small sandy bay. On its South side, between two high rocky precipices, in a grove of cocoa-nut and other trees, stands the village; and in the centre of the bay, about a mile to the North of the village, is a high rock, remarkable for its projecting from a sandy beach. At a distance it appears to be detached from the land. Between this and the high rocky point to the South of the village is a small bank of soundings, stretching some distance into the sea. The South side of this bank has irregular rocky soundings, from 25 to 8 fathoms; to the North of it the edge is very abrupt.

The district of *Ewa* occupies the S.W. portion of the island, extending eastward to within 7 miles of Honolulu, and 20 miles along the sea-shore. Unlike others on this side of the island, it is well watered by copious and excellent springs, the streams from which are sufficient for working sugar-mills. This is the best part of Oahu for raising cattle and sheep, which are seen here in greater numbers than elsewhere.

The Pearl Loch, or *Pearl River Harbour*, lies on the South side of the island; the entrance being about 8 miles East of the S.W. point. It is an extensive inlet of the sea, into which the River Ewa empties itself. It derives its name from the fact of the pearl-oyster being found in it. It is not

met with elsewhere in the Sandwich Islands. The inlet has somewhat the appearance of a lagoon that has been partially filled up by alluvial deposits. It affords abundance of excellent fish. The depth of water in the mouth is only 15 feet; but after passing this coral bar, which is 400 feet wide, the depth of water becomes ample for large ships, and the basin is sufficiently extensive to accommodate any number. If the bar were partially removed, which might be effected, it would afford the best and most capacious harbour in the Pacific. At present there is little necessity for this, as the neighbouring port of Honolulu is ample for all the present requirements.

HONOLULU.—This is the capital and principal port of the kingdom of Hawaii, and indeed of this part of the Pacific Ocean. It is not very many years since it was first frequented by Europeans, but Vancouver passed it without much notice, in March, 1793, such is its apparent insignificance from the entrance. He was afterwards informed by Mr. Brown, of the ship *Butterworth*, of its excellence. His tender, the *Jackall*, first entered it in 1794. Mr. Brown gave it the name of *Fair Haven*. Vancouver calls it *Honoanoano*.

Since the periods above named it has made a wonderful change in circumstances, and few places in the world now have such a variety of population and manners as is to be seen here.

As the whaling fleet became more numerous, wealth was gradually brought here, as it was the principal resort of the ships that came to refit. The population gradually increased, and instead of a town of grass huts, with only one house that had a chimney in 1827, when Captain Beechey came here, it is now a large town of 15,000 inhabitants. The situation being good it was eventually established as the capital of the Hawaiian kingdom, the residence of the consuls of foreign courts, and the chief port in the best channel of intercourse between the eastern coasts of the old, and the western coasts of the new, world. The central part of the city now consists of regularly laid out streets, on either side of which stand houses and warehouses constructed after the European style, generally painted, and frequently placed within spacious enclosures with gardens, while its outer portions are still chiefly composed of grass huts inhabited by the natives. Besides these, there are the king's palace, a fort, numerous churches and chapels, public offices, a custom-house and a sailors' home; also ample wharves, foundries, workshops, and ship-yards to meet any emergency that may arise, even to making a steam-ship if ordered. It has a fine capacious harbour, formed by the coral reef, capable of accommodating 200 vessels at a time, and is perfectly safe in all weathers.

The aspect of the country around Honolulu, as seen from the roads, is barren; the plain on which the town stands is destitute of verdure. This plain extends both East and West from the town, while behind it the land rises gradually towards the Nuuanu valley. Several crater-shaped hills are

North Pacific.

in sight, one of which, called by the foreign residents the *Punch Bowl*, stands out in bold relief on one side of the valley.

The valley of *Nuuanu* is formed by a break in the central volcanic ridges of Oahu; it ascends gradually from behind the town, and is about 7 miles long by half a mile wide at its entrance. It contracts until it reaches the northern side of the ridge, when it suddenly terminates in a deep precipice of 1,100 feet, called the *Pali*. Here the trade-wind rushes violently through between two high peaks above 1,500 feet in height, while their tops condense the clouds, whose waters are descending constantly in small silver rills, that leap from rock to rock on all sides, unite in the middle of the valley, and form a large brook, which is again distributed by the natives to give fertility and luxuriance to the vale below.

One of the most conspicuous points on the South side of Oahu is the *Lealu* or *Diamond Hill*. It lies about $4\frac{1}{2}$ miles to the East of Honolulu, and forms a very picturesque object from the harbour. It is an extinct volcanic crater, the largest coast crater on the island, and has its latter name from the circumstance of bright crystals being found on its sides resembling the diamond.

The mouth of the harbour is formed by an inlet through a coral reef, possibly kept open by the fresh-water stream flowing through the town; this has been supposed to be filling up the harbour and its entrance with alluvial deposit, as a considerable diminution in the depth is observed since the earlier explorations. This is more probably owing to an entire upheaving of the coast, as is evidenced elsewhere in the diminution of water on rocky shelves off the coast and the marks on the coast itself. It is true that this might be remedied without great trouble, by deepening the channel or by doing the same to the more extensive harbour of the pearl lagoons to the westward. But this is at present premature to speculate on; it suffices now for all shipping purposes.

Lights.—In 1869 two lights were established here, which by night will greatly facilitate the entrance. The following is the official announcement and the brief directions in connection therewith.

A light is exhibited from the lighthouse erected on the inner edge of the western reef, bounding the entrance of the channel into Honolulu harbour.

The light is elevated 26 feet above the sea, visible from between the bearings East round by North to N.W. by W., and in clear weather should be seen from a distance of 9 miles. The illuminating apparatus is dioptric or by lenses, of the fourth order.

From the lighthouse the Spar or Fairway buoy bears S. by W. $6\frac{1}{4}$ cables, Diamond point S.E. by E., Barbers point W. $\frac{1}{4}$ S., and the eastern corner of the Custom-house N. by E. $\frac{1}{4}$ E. Near to this corner of the Custom-house, from a tower, a *green light* is exhibited, elevated 28 feet above the sea, and in clear weather should be seen from a distance of 5 miles.

To enter the harbour by night, bring the two lights in a line, and keep them so until within a cable of the lighthouse on the reef, then steer to the eastward, to avoid the end of the spit on which the lighthouse is built towards the East end of the new wharf, and when half-way between the light on the reef and the new wharf, steer N.W. to the anchorage inside.

The following directions for the outer anchorage are by Mr. H. Thompson, master of H.M.S. *Talbot*, in January, 1845:—"Just without the reef, and at a short distance to the eastward of the entrance to the harbour, there is a space of ground which affords a fair anchorage in from 12 to 30 fathoms water, during the period that the N.E. winds blow steadily, viz., March to October, the remaining months being more subject to irregular winds. Those most feared are from the southward, which frequently, during the irregular season, blow very strong, and at the same time send in a heavy swell; therefore vessels lying there should put to sea immediately on the appearance of wind from that quarter.

"The holding-ground is indifferent, consisting of hard sand and coral, and the surface very uneven. The marks for the best anchorage are as follows, viz.: the flagstaff of Fort Honolulu, N. by E.; the summit of a round-topped hill just visible over the inner part of the neck of land which connects Diamond Hill with the other part of the island, bearing about E. by N. This hill is the only one visible in that direction.

The *Harbour of Honolulu* has a bar, with only 21 feet water upon it at low water, and the channel is so narrow and intricate that no stranger should attempt it. The natives understand the signal for a pilot, and will come off if the weather is not too boisterous. Captain Beechey considered the best anchorage outside to be in about 16 fathoms water; the Punch Bowl bearing N.N.E. $\frac{1}{4}$ E., and the highest part of Diamond Point, E. by S. $\frac{1}{4}$ S. A bell buoy now marks the place.

Should it be necessary to enter the harbour, the morning is the best time, as there are then leading winds through the passage; but after the trade-wind has set in it cannot be entered. It is necessary to adopt the precaution of having boats ready to tow or run out lines to the reefs.

The bar was deepened when there was a prospect of the line of steamers between Panama and China being established, as then Honolulu was to be made a calling place. The same with a line from San Francisco to Yokohama. The wharf was much improved and extended, so that vessels of any tonnage may lay alongside and coal there. The depth over the bar at low water was stated to be 21 feet, and at full tide 23 to 24 feet, and that, excepting in the event of southerly storms, which seldom occur, there can be no difficulty in heavy ships entering or leaving at any ordinary half-tides. But it has been officially stated that steamers should not draw more than 18 or 19 feet water to be sure of entering at all times. Besides the conspicuous bell buoy at the outer anchorage, the channel and bar have been buoyed.

The passage through the reef into the harbour, though well buoyed on both sides, is dangerous, and should not be attempted, even if the wind be fair, without a thorough knowledge of the port. From the outer anchorage run along shore in nothing less than 11 fathoms, and the leading marks over the bar are the northernmost black buoy (the third from the entrance on the starboard side of the channel) in line with the southernmost red buoy; when over the bar, stand on in the line of buoys,—the depth in the channel being from $5\frac{1}{2}$ to 6 fathoms. There is always a heavy swell on the bar with southerly winds, making it dangerous. Any one unused to the port should always take a pilot. The harbour affords accommodation for as many as 200 vessels at a time.

Much of the coral banks is exposed at low water. In consequence of the sea that rolls over the reef, and breaks in 4 or 5 fathoms water, boats must follow the same channel as large ships, or in all probability they will be run on the reefs, or be upset.

There are several pilots always ready to conduct vessels into and out of the harbour; and there are also steam-tugs for towage.

Tides.—It is high water, at full and change, at 4^h; the rise and fall being 2 feet at springs, and 1 foot to 1 foot 6 inches at neaps; but the tides here are much affected by the winds, gales (whether from North or South) bringing high tides, and a rise of 3 feet. Sometimes the rise is remarkably low, and without any apparent cause; it has been as little as 6 inches.

Supplies of every kind may be obtained here; and excellent water is carried down from Nuuanu Valley, in iron pipes, to supply the city and the shipping.

The only place remaining to be noticed as an anchorage is *Waikiki*, which is 8 or 10 miles to the eastward of Honolulu. Between these two places there is a vast collection of salt pits, the produce of which is exported to all the countries bordering on the North Pacific. There is anchorage off the village. Whyteete Bay, as Vancouver calls it, is formed by the land falling a little back round the S.E. point of Oahu, and although open above half the compass in the southern quarters, was considered by him to be the best anchoring place in the island, but he did not know of Honolulu.

KAUAI is called *Atooi* in Cook's voyage, *Atowai* in Vancouver's, and *Atoui* by a third. The name is composed of two words—a *Tauai*, literally and *Tauai*. The meaning of the word *tauai* is, to light upon, or to dry in the sun; and the name, according to the late king, was derived from the long droughts which sometimes prevailed, or the large pieces of timber occasionally washed on its shores (Ellis). This island is interesting as being the first land of the group visited by Cook on their discovery. "On Sunday, January 18, 1778, at daybreak, an island (Oahu) made its appearance, and soon after we saw more land bearing North, and entirely detached from the former." On the 19th he anchored in Waimea Bay, on the South side of

Kauai, and was received by the astonished natives with profound humility and reverence, a circumstance which has since been accounted for as stated in our introductory observations.

The island is 28 miles long, and about 20 miles broad. Like the rest of the archipelago, it is of volcanic formation. On the N.E. and N.W. sides it is broken and rugged, but to the South it is more even. The hills here rise with a gradual slope, and at some distance from the shore are covered with wood. This is one of the best cultivated of the islands, and even when first discovered the plantations of the natives were managed with industry and neatness. The highest point of the island is called *Wailioli*, and was estimated by Captain Wilkes at 6,000 feet; it is said that there is a crater on its summit, and that the natives ascend it to gain a view of Oahu, 100 miles distant.

The two extremities of the eastern end of the island lie N. 14° E. and S. 14° W. 9 miles from each other, and are formed by low land. The former is a rounding point, projecting into the ocean from a very remarkable forked hill, that is, in a great measure, detached from the rest of the connected mountains of the island. The latter extends from a range of low hills that stretch along the coast at a small distance from the beach. The country inland here is most enchanting and rich. About a league to the South of the southern extremity lies the S.E., or *Koloa Point*, of the island, formed by a bold, bluff, barren, high, rocky headland, falling perpendicularly into the sea. Between this and the low point is a small cove (*Puna Cove*) accessible to boats only. This portion appears to be well watered. A heavy sea rolls in on this part of the coast. There are some silk (mulberry) and sugar plantations belonging to Europeans.

A few miles to the westward of Koloa, and about 6 miles to the south-eastward of Waimea is the celebrated valley of Hanapepe, which has apparently been formed by volcanic action. At its entrance it is about half a mile wide, and decreases in width as it approaches the mountains. At its head is a waterfall.

The coast must now be approached with great caution, because opposite Kona Peak, on the West side of the entrance to Hanapepe Valley, a coral reef commences, and here stretches some distance seaward; thence it trends along the S.W. shores of the island as far as Point Mana or Kolo,—the westernmost point of Kauai.

Waimea Bay, on the South side, is the best anchoring place on the island, except in the months of January and February, when the trade-winds are interrupted, and the wind blows strongly from the S.W., directly on shore. At about a mile West of Waimea is the spot where Cook's boat first landed on the discovery of the Sandwich Islands. Cook says:—The road, or anchoring place, which we occupied, is on the S.W. side of the island, about 6 miles from the West end, before a village, which has the name of Wymoa.

As far as we sounded, we found that the bank has a fine grey sand at the bottom, and is free from rocks, except a little to the eastward of the village, where there spits out a shoal, on which are some rocks and breakers, but they are not far from the shore. This road would be entirely sheltered from the trade-wind, if the height of the land over which it blows did not alter its direction, and make it follow that of the coast; so that it blows at N.E. on one side of the island, and E.S.E. or S.E. on the other, falling obliquely on the shore. Thus the road, though situated on the lee side of the island, is a little exposed to the trade-wind; but notwithstanding this defect, it is far from being a bad station, and much superior to those which necessity obliges ships daily to use in regions where the winds are more variable and more boisterous. Captain King adds that in running down to the road from the S.E. point of the island he saw the appearance of shoal water in several places at a considerable distance from the land; and when he was about 2 miles to the eastward of the anchoring place, and 2 or 3 miles from the shore, he got into $4\frac{1}{2}$ fathoms water, although the soundings had been usually 7 or 8 fathoms. The whole distance between Koloa and Waimea consists of a series of sunburnt hills and barren plains, sloping gradually to the shore from the mountains, and now and then intersected by ravines or gulches. The village takes its name from a river which, after a course of about 15 miles, falls into the sea at the place. Boats may ascend it for about three-quarters of a mile, and this is the only water that is not brackish. At the village is a stone fort, executed by a Russian trader from the North, but he was expelled by the authorities.

The coast to the westward of Waimea consists of a sandy plain, from one-fourth to a mile wide, and 150 feet above the sea, whence it rises gradually to the mountains. It has a sunburnt appearance, and is destitute of trees. On the low grounds the cocoa-nut tree thrives, and the sea-coast is considered the best ground for fishing, and the manufacture of salt might be extensively carried on.

Point Mana is the West point of the island; it is in lat. $22^{\circ} 4'$, and off it a reef of rocks extends about half a mile from shore. Near this the country assumes a very different aspect; from hence to Hanalai Bay the coast has a very rugged and romantic appearance, rising suddenly to lofty, abrupt cliffs, that jut out into a variety of steep, rugged, rocky points, apparently destitute both of soil and verdure, but terminating nearly in uniform summits, on which, as in the valleys, are patches of lively green, producing a singular effect.

Hanala Bay lies on the North side of the island; Captain Wilkes calls it *Halelea*, signifying the land or place of rainbows, a name arising from the frequent rains, which clothe the country in perpetual green. The village is at the head of the bay.

Hanala Bay, besides bullocks (noble animals, and meat as fine as in Eng-

land), and vegetables of the finest quality, furnishes fruits, poultry, turkeys, &c., cheap and in abundance. Water can be filled in the boats, by sending them into the river.—(Belcher, vol. i. p. 61.)

In August the anchorage is safe, but when the N.W. gales blow, a very heavy sea must tumble into the bay. Captain Sir E. Belcher was informed that a Russian store-ship rode out the season in spite of everything. The anchorage is pretty well covered by a spit, over which there are about 9 ft.; but there is not sufficient space in bad weather for more than three vessels, although in the fine season the bay is spacious.

The landing is within the mouth of a small river, which carries, for a considerable distance up, from one to three-quarters of a fathom, into fresh water, and is further navigable for boats or canoes (drawing 3 feet) several miles.

The scenery is beautiful, and it is surprising that such a favourable spot should so long have been overlooked. The consul possesses a tract of land, on which his tenant (Kellett, an Englishman) feeds cattle, makes butter and cheese, and farms to great advantage. I am certain that our men derived more nourishment from the cattle we embarked there than from any previous diet, and, contrary to the general feeling, preferred it to salt, regretting its loss. I would therefore strongly advise ships of war to sacrifice much to secure these advantages.—(Sir Edward Belcher.)

NIIHAU (*Oneeow* or *Oneehow*) lies 16 miles S.W. of Kauai, the channel between being called the *Kaulaka Passage*. The island is about 18 miles long, and 8 miles broad. The eastern side is rocky and unfit for cultivation, nor is there any anchorage on it.

Niihau was famous for its yams, fruit, and mats, and was the property of the king, but was purchased by Mr. Sinclair, a New Zealand settler from the Canterbury district, who removed here with his family, and uses the island exclusively as a sheep-walk. In 1867, nearly half a million of lbs. of wool were exported, and of hides 304,095 in number were sent from the archipelago.

The natives were a darker race than those on Oahu, and reminded Capt. Beechey strongly of those on Bow Island. They lived almost entirely on the western shore, and were very poor. It is comparatively low, and with the exception of fruit trees, which are carefully cultivated, it is destitute of wood. The soil is too dry to produce taro, but on that account it is well adapted to the growth of yams, &c., which are very excellent, and of an enormous size.

Yam Bay.—The eastern side of Niihau is rocky, and affords neither shelter nor anchorage. On the western side are some small bays or roadsteads, in which vessels may stop with proper precautions. Vancouver anchored off the South point of the island in 14 fathoms, about three-quarters of a mile off shore, bottom soft, sandy, regular, and good, the S.E. point

of the island bearing S. 77° E., the West point N. 48° W., and Kaula Island S. 58° W. He afterwards anchored in Yam Bay in 18 fathoms, with the N.W. point bearing N. 25° W. 1½ mile off, the West point S. 15° E., and Kaula S. 43° W.; but this position, though the general rendezvous for ships, was a much worse position than the former one.

Cook anchored westward of the S.W. point during a strong easterly gale, one anchor in 20, the other in 26 fathoms, the South point bearing E.S.E., and the bluff head to the South of the North point of the road N.E. by N.

Admiral Beechey says:—There is but one place in this bay, the same in which Vancouver anchored, on the western side, where the boat of a man-of-war can effect a landing with safety when the sea sets into the bay, which is of very common occurrence; this is on its northern shore, behind a small reef of rocks that lies a little way off the beach; and even here it is necessary to guard against sunken rocks; off the western point these breakers extend 1½ mile. The soundings in the bay are regular, upon a sandy bottom, and with the wind from the eastward good anchorage, if required, will be found; but it would not be advisable to bring up under any other circumstance.

Lehua or *Oreehoua Island*, off the North end of Niihau, is a rugged, naked, barren rock, to all appearance destitute of soil, and without any signs of habitableness. It is of very small extent, and is separated from the larger island by a channel about a mile in breadth, in which the depth appeared to be very irregular, and is therefore impracticable.

KAULA or *Tahoora* lies 4 or 5 leagues from the S.E. end of Niihau, in a S. 69° W. direction. It is a small, elevated island, only inhabited by flocks of birds, for whose eggs it is visited occasionally.*

BIRD ISLAND or *Niho* is also considered as a member of the Hawaiian archipelago. It lies 39 leagues N. 51° W. from Niihau; was discovered, April 13, 1789, by Captain Douglas, of the *Iphigenia*, who gave the name to it. It had not been previously known to the inhabitants of the Sandwich Islands, who afterwards called it *Modu-manu*, which also means Bird Island. It is merely a barren rock, of volcanic origin; it is bold all round, and is the resort of numerous flocks of sea-birds. Capt. Harvey, R.N., made a plan of it, on a visit to it in H.M.S. *Havana*, Dec. 1856. The island was found to be about three-quarters of a mile long, by one-third of a mile broad, and 880 feet high, the North side being a perfect precipice; but on the South side there is a little bay where landing has been made in the summer season. The master went as close as the boat could safely approach, and pulled along the island to observe the practicability of a footing being

* Cook heard of a small, low, uninhabited island called *Tammatapappa*, *Modoo-papappa*, *Komodoopappa* (i.e., flat island), about five hours' sail from Tahoora. It was said to be visited for the purpose of catching turtle and sea-fowl, but it has never been seen.

obtained in more moderate weather. He found within 600 yards there were soundings in 15 fathoms; could only see one spot—a large boulder beach of about 200 feet in extent—where it appeared possible in the finest weather to land. The men-of-war birds came round the boat in some numbers, and were troublesome; no seals, sea-lions, or animals of any description were observed, nor any appearance of guano. From the formation of the rock and the large amount of heavy rain that falls in its vicinity, it is not possible that any quantity could accumulate; nor were birds seen in such quantities as to warrant the expectation.

The surveying schooner *Fenimore Cooper* passed within a mile of this island, and established its position by three good sets of sights. It was found to be half a mile long East and West, by a quarter of a mile in width, with a peak at each extremity, the eastern one of which was made out to be 534 ft. high. Captain Patty, of the schooner *Maunakawai*, thinks landing practicable, although very difficult, at a small spur of sandy beach on the South side, where he also found a small drain of fresh water; and saw a few seal and plenty of birds. Anchorage is from one-quarter of a mile to 2 miles off the South side, in from 7 to 17 fathoms water.

This concludes the description of the islands composing the Hawaiian Archipelago. In the subsequent paragraphs we shall include all the islands to the northward of lat. 20°, some of which lie to the eastward of the Sandwich Islands.

DETACHED ISLANDS AND SHOALS TO THE NORTH OF LAT. 20° N.

The north-eastern part of the North Pacific is singularly free from isolated reefs or lonely islands, or even of announcements of islands or vigias. On the contrary, the south-western part abounds with lurking dangers, coral reefs and islands, and these have been multiplied to a very large extent by the vague notices derived from older authors, whose positions claim but little consideration, or from the still more vague accounts given by whalers, a class of ships whose estimate of position is of the loosest character. Generally keeping no proper dead reckoning, drifted in all directions by unheeded currents, very long out of sight of land in pursuit of their prey, they have no means of giving a correct longitude or even latitude, and the great similarity which exists among most of the coral reefs and islands, renders their recognition when uninhabited very difficult. In consequence of this the chart is apparently bestrewed with dangers, which it is certain do not exist in the numbers specified, but of which we have no means of deciding as to their merits.

LOS ALIJOS, or *Farallones Alijos*, have been alluded to on page 145. As there stated, they lie off the southern portion of the Californian peninsula. It is a dangerous reef, composed of four principal rocks, which in nearing them show themselves successively. The two first, much higher than the two latter, then appear alone. The highest is 98 feet, the lowest 56 feet high. They have so much the appearance of ships under sail, that such an error, easily made at night, would expose a vessel to the greatest dangers. The name of these rocks, first discovered in 1791 by Captain Marquina, in coming from the Philippines, and not again reported until Admiral Du Petit Thouars' examination, is expressive of their dangerous character—"rocks which land a ship's cargo." Latitude 24° 57' 25", long. 115° 45' 20" W.

GUADALUPE ISLAND lies off the northern part of the peninsula of Lower California. It is high, with bluff shores on the North and West sides, and may be seen from the mast-head, in clear weather, at the distance of 20 leagues.

It is about 15 miles long by 5 miles broad, and is very lofty in the interior, a chain of hills extending through the whole length of the island. The highest of these hills is over 2,000 feet high, and one near the North point of the island is estimated to be even 3,412 feet in elevation. The island can be seen at a distance of about 60 miles, and will appear, when bearing either East or West, lower at its southern extremity than at its northern.

Off the South end of the island are two rocky islets at some distance from the shore, the outermost of which is 500 ft. high. The shores are in general bold, but have not been closely examined; although it is said that a small cove exists on the S.E. shore, which is formed by some rocky islets, and contains the only anchorage in the island, the riding being in 7 fathoms, and the shelter from all winds except those between S.E. and E.N.E.

From unerring indications, there is no doubt that it has been once volcanic; it is very barren on its South end, but in the northern part there are several fertile valleys, and the mountains contain vegetation. Wood and water may be obtained here from a small cove on the N.E. side of the island, and goats' flesh may be had for the trouble of shooting the animal.

The shores are free from dangers one-fourth of a mile from the island. The only anchorage is on the S.E. side, in a small cove, formed by a few rocky islets, which lie off in that direction. Here vessels may anchor in 7 fathoms water, sheltered from all winds, excepting from S.E. to E.N.E., which seldom blow here, as before stated.

This island was generally made by the Spaniards when bound to the southward from Monterey, or from their other northern establishments; in which route they passed to the westward, out of sight of those islands that

form the canal of Sta. Barbara, for the advantage of continuing in the strength of the N.W. winds; and thus they reached the Island of Guadalupe, from whence they steered a course for Cape San Lucas. The North point is in lat. $29^{\circ} 10' 50''$ N., long. $118^{\circ} 18' 30''$ W.*

Andrews Island, in lat. $24^{\circ} 30'$ N., long. $131^{\circ} 20'$ W., was seen by the barque *Dragon*. Her captain describes it as low, but visible 10 miles off. This is all that is known of it, but it seems circumstantial.†

REED ROCKS.—It is stated that Mr. Reed, master of the brig *Emma*, on her route from Tahiti to San Francisco, discovered, October 8 (1850?), two rocks, lying N.E. and S.W., one 150 fathoms long and 66 wide, the other about 100 fathoms long and 38 wide; 5 fathoms were got on one part and 3 fathoms alongside the rock. It was thought that the sea would break on it

* *Shelcocks Island?* Sir Edward Belcher says:—"On December 11, 1837, passed close to Guadalupe, and then explored a degree on the parallel where an island had lately been reported, to fall into the parallel of *Shelvoes*, *Shelcocks*, *Shalers*, or *Shovel Island*; steering easterly to Cape San Lucas, until I had sufficiently determined its non-existence within 30 miles East or West of its assigned position. The *Venus* also went over the same ground on nearly the same errand, and with like success."

Legarde Rock, said to have been seen by the French commander of that name, in the *Jean Pierre*, September, 1868, in lat. $31^{\circ} 12' 15''$ N., long. $125^{\circ} 0'$ W., showing as three points or peaks, 25 or 30 feet high, is most improbable in this great highway.

† *Henderson Island*, marked at 160 miles East of this, is probably intended for the island in South latitude. In addition to this the following may be noticed here East of Hawaii:—

New Island, lat. $28^{\circ} 25'$ N., long. $133^{\circ} 0'$ W. from whaler report.

Gaspar Rock, lat. $26^{\circ} 30'$ N., long. $131^{\circ} 0'$ W., a whaler report, is another disproved danger near this.

Cooper's Island or *Breakers*, in lat. $25^{\circ} 48'$ N., long. $131^{\circ} 26'$ W., or in $25^{\circ} 30'$ N., long. $133^{\circ} 0'$ W. This position was sought over, without success, by the U.S. Exploring Expedition.

Copper (whaler report) or *Copper Island* (China Mail), in lat. $20^{\circ} 6'$ N., long. $131^{\circ} 54'$ W., and also in East longitude, and *Copper Island* lat. $20^{\circ} 26'$ N., long. $130^{\circ} 54'$ W., and also in similar East longitude, may be repetitions of the same report.

Maria Lazara, lat. $27^{\circ} 47'$ N., long. $139^{\circ} 25'$ W.; but this, besides several other positions near it, has been placed in longitude $144^{\circ} 30'$ W., and 156° W. It is manifest, therefore, that nothing can be determined about it.

Barneys Rock, a whaler report, lat. $22^{\circ} 0'$ N., long. $142^{\circ} 0'$ W.

Island, in $21^{\circ} 0'$ N., long. $149^{\circ} 30'$ W.

Philadelphia Island, a whaler report, lat. $29^{\circ} 4'$ N., long. $155^{\circ} 46'$ W. It is marked as *Dona Maria Lazara* on some old charts; but one of the ships of the U.S. Exploring Expedition passed over the site. Arabia Shoal is near it.

Palmer Reef is also improbable. It was said to have been seen in the *Kingfisher*, in lat. $44^{\circ} 23'$ N., long. $152^{\circ} 53'$ W., but it is also on the track of the U.S. Exploring Expedition, July 7th, 1841.

in heavy weather. Lat. 37° 24' N., long. 137° 27' W. They have been alluded to in a note on page 199.

The U.S. sloop-of-war *Falmouth* saw rocks in the same position in 1851. Captain Redfield, of the whaler *Susan Abigail*, in 1856 discovered, according to observations which he calls excellent, 11 miles more to the northward, some rocks, with about 10 feet of water over them, the largest 50 feet broad and nearly 150 feet long, and S.S.E. of them one-fourth of a mile distant, a discoloration of water indicating another and smaller rock. Most probably these discoveries are one and the same danger, the position of which is the mean of those given to them by the discoverers. The barks *What-cheer* in 1858 and *Yankee* in 1863 report to have run over the position without seeing anything.

Captain Redfield's position is 37° 35' N., long. 137° 30' W.

NECKER ISLE was discovered by La Pérouse, November 1, 1786. It is very small, and is only a rock of 500 yards in length, and at most 360 feet in height. There was not a single tree seen on it, but vegetation was abundant towards its summit. The bare rock was covered with birds' dung, and appeared white, contrasting with the different red spots on which the grass had not grown. Its shores are as steep-to as a wall, and the sea broke with fury against it everywhere; off its S.E. point only are a few rocks. Its barrenness renders it unimportant to sailors, but its situation is not so, and was determined by Captain Stanikowitch as 23° 34' N., long. 164° 47' 20" W.

It was surveyed by Lieut. Brooke, U.S.N., in the schooner *Fenimore Cooper*, and its centre is placed in lat. 23° 35' N. (nearly on the tropic), and long. 164° 40' W.

Lieut. Brooke's examination proves the island to be three-quarters of a mile long, West by North and East by South, and 340 yards broad, with two peaks, one at each longitudinal extremity, about 275 feet high, and a small island about 100 yards to the North, connected with the larger by a reef. He found from 15 to 18 fathoms water at 2 miles distance. Captain Patty, of the *Maunakawai*, could not find any landing-place for boats, as the surf broke all around.

It was visited soon after by Captain Brooks in the *Gambia*. He says:—This island is rocky, and about 1½ to 2 miles long, surrounded by a bank making off to the southward about 50 miles, according to Captain Long's statement. Captain Brooks crossed in lat. 23° 14', and found it to be about 15 miles across from East to West. The western edge is very abrupt; the discolouration of the water may be seen at a distance of 3 miles from the mast-head. Soundings are from deep sea to 14 fathoms, which deepen to the eastward gradually to about 35 fathoms. A vessel crossing this reef by

heaving-to can take any quantity of fish of very fine quality. There is a ravine makes down from the S.E. end of the rock, where at some seasons there is water. A boat may land in good water at the foot of this gulch.*

Arabia Shoal.—The ship *Arabia* sailed over a shoal with a large quantity of kelp fast to the bottom, and extending S.S.E. and N.N.W. 2 miles by 1 mile in breadth. The lead gave 11 fathoms in several places. Lat. $29^{\circ} 30'$ North, long. $155^{\circ} 55'$ West. This shoal lying in the route between the Sandwich Islands and N.W. America deserves a special examination.†

Frost Shoal, a bank with 17 and 20 fathoms water on it, was reported in 1859 by the ship *E. L. Frost*. It was of coral bottom, and said to be upwards of 50 miles in extent North and South. Its position would be about $23^{\circ} 45'$ N., long. $163^{\circ} 30'$ W. Nothing more is known about it.—*Naut. Mag.* 1859, p. 606.

FRENCH FRIGATES SHOAL (*Basse des Frégates Françaises*) lies to the N.W. of the Sandwich Islands, and was also discovered and named by La Pérouse, November 6, 1786, during his passage from Monterey to Macao. It is a rocky bank, even with the water's edge. On its N.W. extremity is an islet, or bare rock, of 100 yards in diameter, and 40 or 50 yards in height. The space between this rock and the breakers is occupied by three sand-banks, raised about 4 feet above the surface of the water. The astronomer, M. Dagelet, made the islet in lat. $23^{\circ} 45'$ N., long. $165^{\circ} 50'$, and the eastern point of the reef in long. $165^{\circ} 40'$. Capt. Stanikowitch gives it the same position.

It remained unnoticed for many years, except by some wrecks upon it, attributed, but in all probability without reason, to its wrong position on the chart. But when the guano excitement arose it was examined by Lieut. Brooke in the U.S.S. *Fenimore Cooper*, in 1859, who reported large deposits of that substance. He made the islet in the centre to be in lat. $23^{\circ} 46'$ N., long. $166^{\circ} 16' 10''$ W., or $26'$ westward of Dagelet's position. By the same authority the East extremity is in $23^{\circ} 44'$ N., long. $166^{\circ} 5'$ W.; the S.W. end of the crescent $23^{\circ} 41'$ N., $166^{\circ} 13'$ W.

Lieut. Brooke spent four days in an examination of it, sailing all around and through the inner passages. The guano islet or rock (120 feet high,

* *Doekers Island*, a whaler report, in $23^{\circ} 24'$ N., $163^{\circ} 5'$ W., and also in the same East longitude, probably refer to this.

† A questionable island, *Donna Maria Lazara*, before mentioned, has been shown near this in lat. $29^{\circ} 0'$ N., long. $155^{\circ} 40'$ W.

180 feet base), with a small rock about 250 yards N.N.W. of it, he found in the centre of the reef, and five dry sand-spits, the largest three-quarters of a mile long, from the centre islet bearing N. 76° E. (true), 4 miles distant; the next, 45° E., 6 miles distant; then a very small one, N. 11° E., 5 miles; then one N. 8½° E., 4½ miles, also very small; and lastly, one of half a mile diameter, N. 12° W., 5 miles distant from the centre rock. Besides these, heavy breakers were seen, N.W. ½ N. (true), 6 miles from the rock; then E. by S. ½ S. 9 miles, S.E. by E. ½ E., 5 miles, and S.W. ½ S. 5½ miles from the rock. A passage was found nearly in a straight line from the southward of the N.W. breakers, close by the central rock (West of it), to the S.E. extremity of the reef, in from 12 to 17 fathoms. Lieut. Brooke's position of the central rock is from the mean of a number of excellent observations; the variation he made (1859) 9° 15' E.

It was subsequently visited by Captain N. C. Brooks, in the American barque *Gambia* in May, 1859, and with the *Modern Times*, for the purpose of removing the guano, but none could be found. He says:—

Next visited French Frigate Shoal, situated in lat. 28° 46' N. long. 166° 14' W., or rather this is the position of the principal rock, on which is the very large and extensive deposit of guano reported to exist there. The reef is crescent-shaped, about 45 miles in circumference. The position as given by Captain Brooks, of the *Gambia*, differs from Lieut. Brooke, of the U.S. surveying schooner *Fenimore Cooper*. Captain Brooks is of opinion that his position is the correct one, as he has taken observations on both voyages to the place. He also landed on sixteen small islands or sand-spits which surrounded the rock. One point of the crescent is to the N.W. and the other bears S.S.E. The shoal is protected on the N.E. and S.E. by a reef on which the surf breaks heavily. The guano rock is about 180 feet long and 40 feet wide at the base, and rises very abruptly to the height of 125 feet, forming a ridge, at each end of which there is a space of about 12 square ft. This rock is situated in about the centre of the shoal, and can be seen at a distance of some 8 miles, and closely resembles a full-rigged brig. These shoals open to the West. There is no danger outside of the line of breakers. There is good anchorage inside in from 5 to 14 fathoms water. The largest sand-spit of the group bears about N.E. by E. from the rock, about 4 miles distant. Inside of this spit there is a good harbour, where a vessel of any draught of water may enter and lie in safety from the sea with good anchorage. Water may be obtained on the largest of these spits at about 8 feet below the surface. It is very brackish, and strongly impregnated with lime. The shoals abound with fish and turtle.—*Naut. Mag.* Sept. 1860.

Among the more remarkable wrecks was the *Daniel Wood*, a whaler, on April 14th, 1859. The crew lived on the islets for some time, but were rescued. The *South Seaman* was totally wrecked on them March 13, 1859,

but the crew of that vessel were also saved. The *Rebecca* was lost by mistaking the rock for a ship.

Brooks Shoal.—Captain N. C. Brooks, after leaving French Frigates Shoal and running 30 miles W. by N. from it, crossed a shoal on which he found 14 fathoms water, and saw the bottom distinctly. Although this was the least water found, there may be less, and besides these coral reefs grow up very rapidly at times, and therefore caution should be used when near its position, about lat. $23^{\circ} 52' N.$, long. $166^{\circ} 46' W.$

GARDNER ISLAND was discovered by Captain Allen, of the whaler *Maro*, June 2, 1820. There is no doubt but that it is the same as the *Man-of-War Rock*, and the *Pollard Rock* and *Pollard Island*, of the Americans. According to its discoverer, it is a small island, about a mile in circumference, and about 900 feet high, having at its S.W. point two large rocks running off to the N.W. Capt. Stanikowitch places it in lat. $25^{\circ} 3' N.$, long. $168^{\circ} 1' 30'' W.$ Lieut. Brooke, U.S.N., makes it $3\frac{1}{4}$ further West. By his description it is an inaccessible rock, 170 feet high, with a base of about 600 feet, and a smaller rock close to its S.W. extremity, from which a reef makes out about half a mile. A bank, with from 17 to 20 fathoms water, surrounds the rock, extending westward about 5 miles and S.W. more than 8 miles.

Two **BROTHERS REEF** was so named by Krusenstern, from the vessel which was supposed to be wrecked on it, but it is thought that it was the French Frigates Shoal. The position given was lat. $24^{\circ} 14' N.$, long. $168^{\circ} 30' W.$; but Captain N. C. Brooks says that he passed over the position of an island given as $24^{\circ} 6' N.$, $167^{\circ} 55' W.$, without seeing anything, although there was every indication of land in the vicinity.

MARO REEF was discovered by Captain Allen, in the American whaler-ship *Maro*, in June, 1820, in lat. $25^{\circ} 24' N.$, long. $170^{\circ} 20' W.$ Captain Stanikowitch, who explored it in 1828, found that it was 5 leagues in circumference, and that it was visible from the deck of his vessel at 6 miles off. His position of it is lat. $25^{\circ} 46' N.$, long. $171^{\circ} 49' E.$

It was placed by Lieut. Brooke, U.S.N., N.W. end lat. $25^{\circ} 31' N.$, long. $170^{\circ} 37\frac{1}{2}' W.$

Captain N. C. Brooks says:—We next ran for Maro Shoals, in lat. $25^{\circ} 30' N.$, long. $170^{\circ} 31' W.$ These shoals cover an area of about 35 miles in circumference, are low, and covered with breakers. They may be seen on a clear day from aloft at 5 miles distance; the discoloration of water may be noticed as soon as the breakers are seen. The shoals are enclosed by a line

of detached breakers, and have a sandy bottom, with 1 fathom of water,—no rock or land above the surface, nor any lagoon inside. I consider these shoals very dangerous, as the breakers are low and scarcely to be distinguished from sea caps.

LAYSAN or Moller Island is an American discovery. Captain Stanikowitch, not knowing that it had been previously seen, gave it the name of his vessel. It is a small, low island, inhabited, of a circular form, with a lagoon, and 6 miles in circumference. From his observations it lies in lat. 25° 46' North, long. 171° 49' W.

Lieut. Brooke, U.S.N., makes it in lat. 25° 47' 17" N., long. 171° 52' 47" West, and to be 2 miles long and 1½ mile broad, a low island, covered with shrubs. This is also stated by Capt. Longbank of the barque *Clara*.

Captain Brooks says that Laysan Island is in lat. 25° 46' N., long. 171° 49' W., is 3 miles long and 2½ broad, and covered with a luxuriant growth of shrubs. It is surrounded by a reef about half a mile from the land. Outside of this reef there is a bank 5 miles wide, on which I found from 14 to 19 fathoms water. There is a boat passage inside the reef nearly the whole way round the island. Good landing can be found anywhere, excepting on the South and S.E. sides; good anchorage anywhere on the West side; the best, however, is about half a mile from the S.W. point, in from 8 to 12 fathoms water. It can be approached from any point of the compass, no dangers existing within half a mile of the reef. On the East end of the island I found the remains of a wreck, but saw no signs of a camp.

There is a lagoon on the island about 1 mile long and half a mile wide, with 5 fathoms water in the centre, and coral bottom. On the shores of this lagoon I found salt of good quality.

There are five palm-trees on the island, and I collected twenty-five varieties of plants, some of them splendid flowering shrubs, very fragrant, resembling plants I have seen in gardens in Honolulu. I saw on the beach trunks of immense trees. The island contains about fifty acres of good soil. It is covered with a variety of land and sea birds; some of the land varieties are small and of beautiful plumage. Birds' eggs were abundant.

There is a very small deposit of guano on this island, but not of sufficient quantity to warrant any attempts to get it. Dug a well and found very good water. The reefs here abound in fish and turtle.*

* *Bunker Island*, according to Captain Kotzebue, was discovered by an American, Jan. 11, 1815, in lat. 28° 20' N., long. 172° 30' W. And there is an island named *Philadelphia* in the American list, in lat. 28° 0', long. 173° 30' W. Captain Patty, of the schooner *Manakawai*, sought for it without success.

LISIANSKY ISLAND was discovered by Capt. Lisiansky in the Russian ship *Neva*, striking on its reef on October 15, 1805, and was nearly wrecked. According to its discoverer's description, it is a small, low island, almost on a level with the sea, exclusive of a small eminence on the eastern part. Its soil consists of coral sand, overgrown with grass and creeping plants, and full of holes. There is not any water to be found, and consequently there are no trees or shrubs. Lisiansky found several large trunks of trees thrown on to the beach. He calls the shallow S.E. part of the extensive reef, in the middle of which the island stands, the *Neva Shoal*, from his vessel. This is about 1½ mile E.S.E. from the island from his plan.

Captain N. C. Brooks visited it in the *Gambia* in 1859. He says:—Lisiansky, Lession, and Pell are one and the same island. On most charts quite a group is laid down, but there is only one island, situated in lat. 26° North, long. 173° 57' West. It is 3 miles long and 2 miles wide, and is surrounded by a reef, on which the sea breaks heavily. A bank makes off several miles, on which there is 19 fathoms water, shoaling to 8 fathoms near the reef. This reef is about half a mile from the island on the East and North sides; on the West side it extends in a circular form at a distance of 2½ miles, the inside forming a lagoon. This island should not be approached from the South, as a line of detached breakers makes off for many miles, and can scarcely be distinguished from sea caps. Upon this line the *Holder Borden* and *Conahassett* were lost. This island should be approached from the North and by standing round to the westward, the island bearing due East. Good anchorage may be found anywhere outside the lagoon, in from 10 to 14 fathoms. In entering the lagoon on a line with the reef, there are two very large breakers about three-quarters of a mile apart, being North and South of each other. Between these, on the same line, are lesser breakers, through which a vessel may enter in a channel about a quarter of a mile wide, with 4 fathoms water. Just inside the reef I found 12 fathoms, gradually shoaling towards the land. A vessel may anchor within half a mile of land in 4 fathoms water, with good anchorage. There are rocks under water in this lagoon, which may easily be avoided by keeping a good look-out at the mast-head. I found about a 2-knot current setting North and South; tide rises and falls 24 inches. Good water may be obtained here with very little trouble. The shoals abound with fish and turtle. Landing can be effected anywhere on the island. On the South end, near the centre, there has been a lagoon, but it is now partially overgrown with shrubs.

On the East point, about half-way, is a hill about 40 feet high, with a look-out pole and cask. On the South end I found a ship's house, which had been used to sleep in. On the North end I saw the trunk of a redwood tree, 12 feet in circumference. On the West side found a notice left by the *San Diego*, taking possession for parties in San Francisco, dated April 27th, 1842.

1859. I consider the lead the safest guide at night among these islands, as they are all surrounded by a bank for some distance off shore. Passed over the position of Neva Island, but saw no land.

There is a dangerous shoal discovered by Captain Stanikowitch in 1827. The eastern extreme of this lies S.E. $\frac{1}{2}$ S. $7\frac{1}{2}$ miles from the N.W. part of the island, and its western extremity at the distance of 4 miles.

The islands called *Laskar*, *Lasan Rys*, *Lassiano*, *Neaves*, and *Neva*,* are doubtless intended for the above, as the positions of most of them have been passed over. It has been also called *Sapron Island*, and *Pell Island* by Capt. Pell, of the whaling brig *Delaware*.

Capt. Lisiansky places the centre of the island in lat. $26^{\circ} 2' 48''$ N., long. $173^{\circ} 42' 30''$ W.; Captain Brooks, as before stated, in longitude $173^{\circ} 57'$ West.†

A Bank, reported by Captain Pell, of the brig *Delaware* (see note below) in lat. $25^{\circ} 50'$, long. $174^{\circ} 26'$, or, according to whaler report, 1° more to the eastward, apparently lies to the S.W. of Lisiansky Island. Lieut. Brooke, U.S.N., of the *Fenimore Cooper*, found bottom at 15, 17, 18, 20, 25, and 40 fathoms, between the parallels of $25^{\circ} 43'$ N. and $26^{\circ} 3'$ N., and the meridians of $173^{\circ} 29'$ W. and $173^{\circ} 32'$ W. It appears to be a south-westerly extension of the bank around Lisiansky, which island the *Cooper* could not gain on account of stormy weather.

The PEARL and HERMES REEF is an extensive shoal, on which two British whale-ships, the *Pearl* and the *Hermes*, were wrecked on the same night, and within 10 miles of each other, April 26, 1822. They were cast away on the East side of the island, and were fortunate in having favourable weather for several days, which enabled them to save a great portion of

* *Neva Island*, in $25^{\circ} 50'$ N., $172^{\circ} 20'$ W., was not seen by Captain Patty, schooner *Manuakawai*, nor by Capt. Brooks in the *Gambia*, as above stated.

† Some very doubtful islands have been announced in this neighbourhood.

An island, lat. $28^{\circ} 35'$ N., long. $171^{\circ} 42'$ W. (China Mail).

Massachusetts Island, lat. $28^{\circ} 30'$, long. $176^{\circ} 50'$ W., whaler report. Captain Patty, of the schooner *Manuakawai*, ran over the place without seeing it, or *Philadelphia Island*, lat. $28^{\circ} 20'$ N., long. $172^{\circ} 30'$ W.

New Island, $26^{\circ} 24'$ N., $170^{\circ} 54'$ E., and *Bassious Island*, $26^{\circ} 6'$ N., $173^{\circ} 27'$ E., are both from whaler report, and are very doubtful. *Laysans Rys* and *Laskar Reef*, sometimes placed hereabouts, are evidently Lisiansky Island, badly spelt, and placed in East instead of West longitude.

Drakes Island, a whaler report, lat. $25^{\circ} 30'$ N., long. $174^{\circ} 0'$ W., is probably Lisiansky Island.

An island in $21^{\circ} 0'$ N., long. $176^{\circ} 30'$ W., from whaler report.

Palmer Reef, according to Captain Palmer, of the *Kingfisher*, in lat. $20^{\circ} 54'$ N., long. $173^{\circ} 25'$ W., has 4 feet water over it.

their stores, and to build a vessel of about 30 tons from the wrecks; this they did in six weeks, and reached the Sandwich Islands in safety.

It was visited by Morrell in 1823, by Stanikowitch in 1827, and a plan of it is given by Captain Duperrey. There are considerable differences in the respective positions assigned by each.*

Captain Stanikowitch says it consists of several small islands, of which the two largest are named Pearl and Hermes, encircled by a reef, through which is a passage by which the *Deliverance* passed to an anchorage near the largest of the two islands.

Captain N. C. Brooks says that the group consists of twelve islands, surrounded by a reef 50 miles in circumference, on which the sea breaks heavily. It is open from the West. There is a lagoon inside, where I found from 5 to 15 fathoms within 2 miles of the land. A vessel may approach from any point. The largest island, which bears E. by S. $\frac{1}{2}$ S. from the entrance, may be approached within 2 miles safely. There is good anchorage outside, in from 8 to 12 fathoms, on the N.W. side. Current sets to the North and South at the rate of 2 knots. Tide rises 24 inches, the prevailing winds being from the E.S.E.

The largest islands are covered with coarse grass and trees. I saw the remains of the two wrecks, the keel, stem, and stern-post, with three iron tanks, still standing. I brought away a wooden mortar used by the party on shore. The remains of the camp still exist on the large island. I took possession of this group. A bank makes off to the East and North for about a mile, and to the West for several miles, with from 8 to 16 fathoms, and no dangers outside the breakers. Plenty of fish and turtle.

It was partially examined and the positions established by Captain Reynolds, in the U.S.S. *Lackawanna*, in 1867. He says:—Pearl and Hermes reef, like Ocean and Brooks Islands, has a coral wall above water at its N.W. extreme, which, however, shows more in the shape of detached rocks than as a continuous parapet, and, soon expending itself beneath the surface, does not reappear, at least so far as our examination showed; this was not very close, as I had time only to get the outline of the reef.

The N.E. corner includes a sand island. Another showed itself some miles to the westward in the lagoon. Three others lie along the southern edge of the reef, which turning to the northward and westward, close to the westernmost island, soon after ceased to show any signs of breakers. Shoal water,

* *Delaware Bank*.—The American brig *Delaware*, H. Hunt, lieutenant-commander, discovered a bank above the water in lat. $27^{\circ} 26'$ N., long. $174^{\circ} 25'$ N., in 1844, which seen at some miles distance, appeared to be 12 or 14 miles long. It is stated, also, that there are several others in the neighbourhood, many of which are not known. It should be noticed that this Delaware Bank is above water, and 95 miles to the North of that noticed above.

however, makes out for some miles to the West, and then trends in north-easterly towards the N.W. rocks. In this the western side of the reef resembles French Frigate shoals.

We made the circumference of the reef to be 42 miles. Its shape is irregular, its diameter from North to South $9\frac{1}{2}$ miles, from East to West 16 miles. N.E. point of reef, lat. $27^{\circ} 56' 30''$ N., long. $175^{\circ} 46' 0''$ W.; S.W. end, lat. $27^{\circ} 48' 45''$ N., long. $176^{\circ} 0' 30''$ W.; S.E. point, lat. $27^{\circ} 48' 0''$ N., long. $175^{\circ} 47' 30''$ W.

OCEAN or Cure Island is an American discovery, the existence of which was confirmed by Captain Stanikowitch, of the Imperial Russian navy, in 1827. It is a small low, and very dangerous island. It was examined by Captain W. Reynolds, U.S.N., in the ship *Lackawanna*, in 1867, and is thus described:—

Ocean Island is almost the facsimile of Brooks Island, as will appear from an inspection of the chart. It commences also with a coral wall at its N.W. extreme, which continues without a break until it dips under water about the centre of the Green Island, but does not crop out again. From the end of the wall the line of breakers continues to their termination about a mile West of the N.W. end of the Sand Island; from thence to the N.W. rocks the water is shoal, and affords no entrance into the lagoon, all of which is shallow water.

The *Green Island* is identical in appearance from the sea with Middle Brooks Island, except that some portions of the shrubbery appeared to have grown a few feet higher. There is a small sand spit between it and the Sand Island, as is the case at Brooks island; but the *Sand Island* here has not more than 10 feet elevation above the level of the sea. The trunk (and roots) of a large tree was lying high and dry on the S.E. side of this Sand Island, and on the N.E. end of the Green Island we saw a ship's lower mast, which looked as if it had recently got ashore.

This reef is $14\frac{3}{4}$ miles in circumference; no outlying dangers seen from the masthead, and no other land.

Sand Island is in lat. $28^{\circ} 24' 45''$ N., long. $178^{\circ} 27' 45''$ W.; N.W. point of Green Island, lat. $28^{\circ} 24' 50''$ N., long. $178^{\circ} 26' 5''$ W.

Captain Brooks describes it as consisting of three small islands or rocks surrounded by a reef 30 miles in circumference. This is the island on which Captains King and Molteno were wrecked in the *Gledstone*. The American whale ship *Parker* was also lost here. A bank makes off round this reef at a distance of a mile with 25 to 30 fathoms water. The three islands are on a line East and West. The surf makes off to the East a quarter of a mile, and to the N.W. 12 miles. The reef opens to the S.W. for about 3 miles. The best anchorage is found by bringing the N.W. point of the breakers North, in from 7 to 12 fathoms water, one mile from the reef.

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BROOKS OR MIDWAY ISLANDS.

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Current sets North and South about 2 knots. Tide rises 22 inches. They can be approached from any point, and can be seen from the mast-head 8 miles, being about 20 feet high, and covered with bushes. On the North end of the large island, which is $3\frac{1}{2}$ miles long by $1\frac{1}{2}$ miles wide, there has been a lagoon, but it is now overgrown. On this island I found the remains of wrecks. Good water may be obtained on this island. The second island in size is about 2 miles long and half a mile wide, with little vegetation, few fowls, and plenty of turtle. The third is a mere sand-spit.

It is probably the same as those described as *Massachusetts Islands* of the Americans, and *Dry Island*, with an attached reef, of Captain Joy.

BROOKS OR MIDWAY ISLANDS.—This atoll is of much more interest than its uninhabited and barren condition would warrant. It was discovered by Captain N. C. Brooks, in the *Gambia*, July 5th, 1859. He called the two islands *Middlebrook Islands*, and took possession of them for the United States, leaving a Kamtchatkan as a settler. On his return he kept its position a secret, and his discovery was utilized by the Pacific Mail Company, who intended forming a depot here for their Trans-Pacific steamers, in preference to Honolulu, which was thought to be under foreign influence, establishing here a coaling and refreshment station.

With this view it was closely examined in September, 1867, by Captain Reynolds, U.S.N., in the *Lackawanna*, and the following is his report, as published by the U.S. Bureau of Navigation.

The reef encircling Brooks Island is pear-shaped, with its stem part to the eastward. It is 18 miles in circumference, as measured by the patent log in the two circuits around it, and is without a break, except on its western side. At the N.W. point is a little patch of breakers, a few detached rocks, and then commences a compact coral wall of about 5 feet elevation, and, as far as our observation went, from 6 to 20 feet in width, which continues for $4\frac{1}{2}$ miles to the southward and eastward, when it loses its uniformity of surface, and presents a line of detached rocks, very little more than awash, for $2\frac{1}{2}$ miles to the southward; there, off the centre of Middle Brooks Island, the rocks dip under water, but re-appear 2 miles to the westward, from whence they again show as a continuous wall for about $4\frac{1}{2}$ miles to the northward and westward, ending there, and forming the South side of the entrance to *Welles Harbour*.

The entrance is about three-quarters of a mile wide, and from its northern edge to the N.W. rocks there is a bed of coral from 1 to 16 fathoms, showing above water in one place, with occasional breakers.

The northern, eastern, and southern portions of the reef are steep-to, to the rocks. We saw the bottom in two places only where the soundings are shown on the chart.

On the West side sheltered anchorage, during the trade winds, can be had

in from 10 to 13 fathoms, but on a very foul bottom. The best outside anchorage is in *Seward Roads*, in 10 to 13 fathoms water.

Middle Brooks Island.—At the eastern extremity of the reef, or in the stem of the pear, is *Middle Brooks Island*, also pear-shaped, one and a quarter miles in length, and half a mile wide. Its North point is in lat. 28° 13' 30" North, long. 177° 18' 20" West, of a nearly uniform elevation, varying from 6 to 15 feet, covered with a growth of small shrubs, coarse grass, and some vines. The soil is all coral, sand, and shells, except a small portion on the South side, where there are a few acres of mould 2 feet in depth. No black earth is to be found on this island. The beach is of a dazzling whiteness. By digging 4 to 7 feet, water is reached, which becomes potable after standing.

A mile and a quarter West of Middle Brooks Island is *Lower Brooks Island* (a small spit, intervening a sand heap of irregular shape, 1½ miles long, three-quarters of a mile broad, and 57 feet high at the flagstaff, its greatest elevation).

Vegetation is just commencing on this island, in the shape of detached clumps of shrubs around portions of its edge, and an occasional growth of grass, the greatest abundance being on its S.W. extremity. No black earth is to be found on it; on the contrary, the glare from the white sand distresses the eye.

Captain Burdett informed me that he had seen 250 yards of it wash away, and begin to re-form, during the few weeks he had been ashore. The sand spit up by the N.W. rocks, which was quite conspicuous when we anchored near it on the 16th, had almost disappeared by the 27th, when I landed on it; but, from the quantity of sand thereabouts, I presume a permanent sand island is forming.

On the lower island the agent of the Pacific Mail Company has established himself, because it borders on the harbour.

Welles Harbour is formed very much like that of Honolulu, is rather more roomy and as safe, but has not quite the same depth of water on its bar, having but from 21 to 16 feet at low water. The anchorage is in lat. 28° 14' N., long. 177° 23' 15" W.

The bar is quite narrow, and has an uneven bottom of coral rock and small sand holes. Its depth varies from 21 to 16 feet, but changes so often and so constantly, from 3½ to 3 fathoms, as to make it unsafe to count on crossing it without getting a three-fathoms cast or two. We had 19 feet going in, and two casts of 18 feet in going out, both times at low water.

Like Honolulu, the entrance to it is from the West, through a narrow opening in the coral reef 800 feet across where most contracted. It can be entered as readily as Honolulu at all seasons of the year. Depth of water for anchoring 5 to 7 fathoms, white sandy bottom.

This harbour is cut off from the lagoon by shoal water a mile in width:

and our survey, carefully made, does not disclose a passage anywhere for ships into the lagoon.

It would be possible for a light-draught vessel to get into the lagoon by passing to the northward of the "middle ground," and threading her way in among the rocks, but no channel proper for ships exists.

The lagoon is 2 miles in length, and one and a half miles wide at its greatest breadth. There are many coral lumps in it, with from 1 or 2 fathoms water over them; otherwise these soundings are regular, over a white sandy bottom.

Welles Harbour must, therefore, be the resort for ships drawing less than 18 feet, or, at high water, of a little over that draught. Vessels of deep draught must lie in *Seward Roads*, picking out a sandy bottom to let go in.

The greatest rise and fall of the tide, observed during the neap tides, was 18 inches; the lowest 15 inches. Ebb runs $6\frac{1}{2}$ hours, flood $5\frac{1}{2}$ hours. From the appearance of the beach I suppose the rise of the spring tides is as much as 3 feet, which would allow a deeper draught to be carried over the bar at those periods. The bar is well within the entrance, and there is no swell on it during the trade winds.

The flood sets to the northward, the ebb to the southward, from 1 knot to 2. At Welles Harbour the current *always* ran out to the westward, with very little strength.

The coral shelf which runs from the N.W. end of the reef to the southern wall gives very irregular soundings, having deep fissures between the rocks, and again spaces of sandy bottom. On this shelf, at our anchorage of the 23rd of August, we lost one anchor with 15 fathoms chain, and broke the flukes off another; could not recover either of them, although we searched for them with all the boats for five days.

Two circuits of the reef made with the ship, with good look-outs aloft, disclosed no dangers outlying it; and, so far as our observation goes, Pearl and Hermes Reef to the eastward, and Ocean Island to the West, are the only dangers in the way of direct approach.

Steamers, in approaching Brooks Island from the eastward, should make Middle Brooks Island, and follow the southern wall to the entrance of the harbour. If coming from the West, the Lower Island should be made. Sailing vessels from the eastward, during the trade season, should keep to northward of the reef, and pass around the N.W. rocks, to retain a fair wind for *Seward Roads*. Square-rigged vessels must warp into the harbour with easterly winds.

On the N.E. beach of Middle Brooks Island a broken lower mast of a ship is lying; it is $2\frac{1}{2}$ feet in diameter, and strengthened with iron bands. On the East beach and on the bluff occasional drift timber is to be met with, and some lumber, mostly spruce and redwood. On the West side or lagoon

beach, is a portion of the trunk of a redwood tree 5 feet in diameter, and also the skeleton of a calf sperm whale. On the lagoon side of the other island two lower masts of junks are stranded, and several redwood logs elsewhere, one of these over 2 feet in diameter.

Tropic birds, men-of-war hawks, and gulls, swarm upon these islands. A few curlew and plover are the only land birds met with. Turtle abound, but seals were seen only occasionally. Fish of many varieties in great abundance; we hauled the seine frequently, catching enough for all hands; among them many fine mullet.

As there is more than ordinary interest in this lonely spot, we add the account given by the naturalist, S. D. Kennedy, Esq., surgeon to the *Lackawanna*.

I have made an examination of the soil, growth, and water upon Brooks Island, and have to report as follows:—

These are two long low islands chiefly formed of coral shells and sand. They lie in a lagoon surrounded by a barrier reef, except at one point, where a breach in its continuity affords an entrance of three fathoms in depth.

The North island is one mile in length and half a mile in width; while South Island is somewhat larger and higher, but has less soil and scantier vegetation. A beach consisting of white sand, disintegrated shells and coral, extends from the lagoon to a distance of from 50 to 100 yards all around the North island. Inside of this space the island gradually sloping from its two higher points (the north-eastern 15 feet, and north-western 8 feet), is covered with a growth of coarse grass and low shrubs. From its north-eastern point a ledge of coral rock, lying at an angle of five degrees, extends about 100 yards into the lagoon. From this point a fringing reef of the same kind of rock, at about the same declination, runs for two-thirds of the extent of the eastern side of the island.

Judging from this peculiarity of coral formation, and the numbers of dead shells, corals, and mollusks found on the highest points, this portion of the island seems to be emerging.

Over all that part of the island where vegetation is found, there is a superficial layer of fine, porous, grayish sand; but generally it is devoid of vegetable mould. Beneath, you come at once to coarse sand and gravel.

On the South side of the island there is a slight depression, embracing about five acres, extending from N.N.E. to S.S.W. This area has a superficial stratum of vegetable mould from 18 inches to 2 feet in depth, mixed with a small per-centage of guano; beneath this is a layer of coarse sand of the depth of one foot, and below this another stratum of loose stone, shells, and corals, closely packed together, extending down to the hard coral. This foundation of the island, as of the reef, consists of madrepora, meandrina,

and porites coral. But little of the red coral can be found about the island or in the lagoon. This embraces the whole extent of anything like true soil that I was able to find on the island. This mould is, I think, of sufficient richness to raise potatoes, peas, beans, and other vegetables adapted to light soils. There is a small amount of guano mixed with it; and with cultivation it would doubtless become richer by the addition of decomposed vegetable matter.

The vegetation of the island consists entirely of shrubs, herbs, and coarse grasses; none of the shrubs are over 3 to 5 feet high. Of these, and the herbs, the principal families are the leguminosæ, lobeliaceæ, portulacææ, and convolvulacææ. Some seem to be new species of the different genera of the above families.

On both islands several wells have been dug and water found at depths of from 4 to 7 feet. I have tested the water taken from these as far as the materials which I have will admit. When first collected, the specimens were so full of sand and organic impurities in a state of suspension, that it was necessary to filter them. After filtration, tested by different re-agents, they were found to be hard, free from organic impurities in solution, to contain carbonic acid, carbonate of lime, and a per-centage of chlorides. The quantitative analysis of these constituents I have been unable to make for want of proper materials, but have preserved specimens for further experiments. It becomes better adapted to drinking after standing some time. Capt. Burdett, of the Pacific Naval Steam-ship Company, is reported to have found fresh water; but so far, he has chiefly used it for washing, and the specimen sent off to me gave the same results, when tested, as the others. The water seems to become purer in proportion to the depth; and there is every evidence that wells, properly sunk to a good depth, would afford a good supply of potable water.

Immense numbers of sea birds are constantly hovering over and alighting upon these islands. The bushes and surface of the ground are thickly covered with their nests; while the young birds, unable to fly, are so numerous as to make it difficult to walk any distance without trampling upon them. The principal varieties are gulls, tern, gannet, men-of-war, and tropic birds. From such vast number there should be a large amount of guano deposited; but, except in the five acres I have spoken of, its accumulation is small, owing to the looseness or porousness of the soil allowing it to be washed away or filtered through it.

The lagoon is full of fish, seal, and turtle. The seal is the *phoca vitulina* or common hair seal, and is not of much commercial importance. The fish belong principally to the mullet, perch, and mackerel families; many of them are of most brilliant colours, and seem to be species of the genus *coryphæna* (dolphins). Large quantities of the holothurian, *beche de mer*, exist

on the bottom of the sea, both inside and outside the reef, and can be gathered without any difficulty.

During the seventeen days that this vessel remained at the islands, the lowest point which the thermometer reached was 72°, while the highest was 89°. The barometer varied from 29.22 to 30.25.

There appears to be enough true soil, of sufficient depth to raise a good many vegetables upon it at present, and with but little trouble the extent of this area might be increased.

The water in some of the wells now dug might be used in an emergency, and doubtless by sinking properly constructed wells to a sufficient depth, perfectly potable water may be found. Owing to the nature of the soil, these may be made with but little trouble, and at a very small expense.

KRUSENSTERN ROCK was discovered by Lisiansky, October 23, 1805. The bank around it appeared to stretch North and South about 2 miles, and the sea only broke on it in one place. Lat. 22° 15' N., long. 175° 37' W. It is probably the same as *Sounders Island* and *Pylstaart Island*, laid down 16 miles to the N.W. of it.

Patrocinio, or Byers Island, was discovered in 1799 by Captain Don M. Zipiani, commanding the Spanish vessel *Senhora del Pilar*. He states its extent to be 3 miles from N.N.E. to S.S.W., and is in lat. 28° 9' N., long. 175° 48' E.; but the U.S. surveying vessel *Peacock* passed near this spot without seeing it. This renders it more probable that it is identical with Byers Island of Captain Morrell, of guano celebrity. This he places in lat. 28° 32' N., long. 177° 4' E., but this position cannot be depended on.

Patrocinio, or Byers' Island, according to Morrell, July, 1825, is moderately elevated, and has some bushes and spots of vegetation. It is about 4 miles in circumference, and has good anchorage on the W.S.W. side, with 15 fathoms water, sand and coral bottom. There are no dangers around this island except on the S.E. side, where there is a coral reef running to the southward about 2 miles. Sea-birds, sea-elephants, and green turtles resort to it, and plenty of fine fish may be caught on its shores with hook and line. Fresh water may be had here from the S.W. side of the island, which is of volcanic origin. But as said above, the positions and even the existence of the islands, are very questionable.*

* *Morrell Island* is another so named by Krusenstern from its discoverer, by whom it is placed in lat. 29° 57' N., long. 171° 31' E. It is said to be a small, low island, nearly level with the water, 4 miles in circumference; it was covered with sea-fowl, and its shores were lined with sea-elephants; green turtles were in abundance (July, 1825). Apparently of volcanic origin.

On the West side of the island there is a reef which runs off about 10 miles, while that

SIXTY-FOUR FATHOMS OR MELLISH BANK.—A bank has been several times announced hereabout. The first in lat. $36^{\circ} 25' N.$, long. $179^{\circ} 30' E.$, from a notice in the China Mail. It is placed a degree further South, from a report in the Alta California, and an American chart places it a degree still more South. *Mellish Bank* is said to be in lat. $34^{\circ} 25' N.$, long. $178^{\circ} 47' E.$ These possibly refer to the same, if it exists. At all events it will be desirable to know whether there are soundings here. Until the negative is determined, it may be retained, as not being dangerous.

CRESPO, or *Rica de Plata*, is said to have been discovered by Capt. Crespo, in the Spanish galleon *El Rey Carlos*, October 15, 1801, and seeing it 10 miles off, says it is not low, and that it is in lat. $32^{\circ} 46' N.$, long. $170^{\circ} 10' E.$ It is also placed by whaler report in $33^{\circ} 56' N.$, $169^{\circ} 15' E.$ Against this it may be stated that it was neither seen nor heard of by Du Petit Thouars, who passed near it.

Admiral Krusenstern says, that as the Japanese believe in the existence of an island of silver, and one of gold, it is probable that Spaniards have applied these attractive names during their search for the precious metals in the South Seas. The navigator would make a loss of time in seeking the fabulous isles of *Rica de Oro* and *Rica de Plata*, the latter term sometimes being applied to this island*

on the S.E. extends about 30 miles in the direction of S.S.E. These reefs are formed of coral, and afford good anchorage on the S.W. side; but on the East side the water is bold close to the reef. Another doubtful island in the same latitude is placed in long. $175^{\circ} 42' W.$, from whaler report.

* To the southward of this the following doubtful islands may be noticed:—

Burrows Island, lat. $22^{\circ} 0' N.$, long. $168^{\circ} 27' E.$, rests upon a single announcement in the China Mail.

An island, in $23^{\circ} 3' N.$, $162^{\circ} 57' E.$, from whaler report.

Deik's Island, $23^{\circ} 45' N.$, $163^{\circ} 14' E.$, probably is the same as *Necker Island* in West longitude.

Darker's Island, $22^{\circ} 24' N.$, $163^{\circ} 5' E.$, is evidently meant for the same.

An island, in lat. $31^{\circ} 19' N.$, long. $160^{\circ} 42' E.$, is from whaler report.

Sebastian Lopez or *Lobos Island*, in lat. $25^{\circ} 0' N.$, long. $158^{\circ} 0' E.$, or $154^{\circ} 0'$, is only known from the old Spanish charts

Tres Columnas or *Columnas Island* (Spanish charts), in lat. $29^{\circ} 0' N.$, long. $160^{\circ} 0'$ or $162^{\circ} 0' E.$, is not otherwise known. The latter position was crossed by Capt. Lutke.

A reef, in $26^{\circ} 0' N.$, $160^{\circ} 0' E.$, has not since been found.

Volcan Island, on old authority, in lat. $22^{\circ} 35' N.$, long. $160^{\circ} 0' E.$

La Mira or *Laomira*, in lat. $20^{\circ} 25' N.$, lon. $164^{\circ} 15' E.$; *Camira* (the same name mis-spelt), in lat. $21^{\circ} 35' N.$, long. $160^{\circ} 0' E.$, have been given on the authority of the Spanish chart of 1743, but cannot now be recognized.

Decierta Island, in lat. $20^{\circ} 10' N.$, long. $165^{\circ} 20' E.$; and another *Decierta*, in lat. $23^{\circ} 25' N.$, long. $160^{\circ} 45' E.$, are unknown, but are near to Wakes Island, page 887.

Otra, in $23^{\circ} 10' N.$, $167^{\circ} 0' E.$, is not known.

In all the space between this and the coasts of Japan and Formosa we have a great number of shoals and islands marked on the charts. As the existence, or at least the positions, assigned to many or most of these appear to be very doubtful, there is considerable difficulty in determining on the point. They would seem to have been inserted on the charts from the uncertain reckoning or observation kept on board whaling vessels, or others of that class, which, from the very nature of their pursuits, cannot be entitled to much confidence.

Very many of these supposed discoveries are evidently of the most worthless nature, and it would seem almost a waste of space even to enumerate them. In the great work of Admiral Krusenstern these guesses and mistakes are most industriously collected, and their proper value assigned in most instances. In the later work published by the U.S. Bureau of Navigation, 2nd edition, 1866, similar reports have been incorporated with the older notices, and we have followed in many instances that work. It will be in the memory of most sailors how the chart of the North Atlantic was disfigured with "vigias" and supposed islands and shoals. The deep sea sounding machine has disposed of nearly every one of these terrors to the navigator. It were much to be desired that the same process could be applied to the great highways of the North-western Pacific. It is believed that in the ensuing lists only those deserving of any credence are preserved in the text. Those which are manifestly spurious are given as foot-notes.

Marcus Island has been shown as a doubtful island, in lat. 24° 25' N., long. 153° 45' E., but several other announcements of islands are found hereabout. *Islands*, from whaler report, in 24° 0' N., long. 153° 40' E. Another island in 24° 5' N., 154° 10' E. It was seen by Captain Kilton, in the *David Hoadley*, in May, 1868. He describes it as a low level sandy island, covered with trees and bushes, about 2 or 3 miles long East and West. No breakers were visible, extending any great distance, from either end; its width was not ascertained. The position of the West end, by a set of sights, was 24° 24' N., 153° 58' E., or 20 miles northward of Weeks Island, and differs from it in not having any knoll in the centre. We may therefore infer that they are distinct islands.

Weeks Island, originally a whaler report, was first properly described by Captain Gelett, in the *Morning Star*, the Hawaiian mission ship. It was seen on December 17th, 1864. It is about 5 miles long, densely covered with trees and shrubbery, with a white sandy beach and a knoll near the centre, rising about 200 feet above the sea. There were no signs of inhabitants on it. A reef extends to the North of the island. The position of this fertile island is important and reliable. It lies directly in the track of whalers bound from the Carolines to the Sea of Okhotsk. It might be considered

that it is the same as Marcus Island, but the descriptions do not coincide. Captain Gelett's position, which must be taken, is lat. $24^{\circ} 4' N.$, and long. $154^{\circ} 2' E.$ *

MARSHALL ISLANDS (*Los Jardines*?).—Two small islands were discovered, in 1788, by Captain Marshall, of the ship *Scarborough*, whose name is given to the archipelago to the eastward. They have been thought to be the same as *Los Buenos Jardines* of Alvaro de Saavedra, in 1520. Another group, called *Los Jardines*, was also discovered by Villalobos in 1543, but the situation of both of these must be far away from this part, if even they could be identified. Perhaps it would be better to name them the *Scarborough Islands*. They are placed in lat. $21^{\circ} 40'$, long. $151^{\circ} 35' E.$ By another report they are in lat. $20^{\circ} 50' N.$, long. $151^{\circ} 40' E.$

Margaret Islands (*Malabrigos*), a group of three islands, discovered, in 1773, by Captain Magee, in lat. $27^{\circ} 20'$, long. $145^{\circ} 45'$. They have been considered to be the *Malabrigos* (bad shelter) of Bernard de Torres, in 1543, but there is no possibility of deciding on the point, but it is possible that they were the Volcano Islands.†

Grampus Islands were said to have been discovered by Captain Meares, April 4, 1788. They consist of two islands close together, and a third to the S.W. of them. The position of them is not stated by Meares, but Krusenstern deduces it from his track as lat. $25^{\circ} 40'$, long. $146^{\circ} 40' E.$ The position thus

* The following are doubtful:—

Wakes Island, in lat. $31^{\circ} 14' N.$, long. $155^{\circ} 0' E.$, a whaler's notice; and a *reef*, in $31^{\circ} 18' N.$, $153^{\circ} 20' E.$ An *island*, in $31^{\circ} 0' N.$, $147^{\circ} 16' E.$

Several others, which need not be enumerated, may be included in the foregoing. It may be observed that hereabout the strong currents may have caused very bad reckoning, and it is possible that they may refer to the reefs and islets far to the West, lying South of Jodo Gulf. See page 625.

Congress Island, in lat. $23^{\circ} 30' N.$ (on the tropic), long. $148^{\circ} 0' E.$, from whaler's report.

Islands, from whaler report, in $25^{\circ} 10' N.$, $153^{\circ} 35' E.$ A *reef*, in $25^{\circ} 28' N.$, $152^{\circ} 40' E.$

An *island*, from whaler report, $26^{\circ} 6' N.$, $154^{\circ} 36' E.$

A *reef*, announced in the China Mail in lat. $31^{\circ} 30' N.$, long. $154^{\circ} 0' E.$ *Ganges Reef*, in $30^{\circ} 47' N.$, long. $154^{\circ} 20' E.$, and three doubtful shoals in $31^{\circ} 30' N.$, $153^{\circ} 0' E.$; $31^{\circ} 18' N.$, $154^{\circ} 0' E.$, are most probably repetitions of the same report.

A *reef*, in lat. $20^{\circ} 42' N.$, long. $155^{\circ} 0' E.$; and another in $20^{\circ} 30' N.$, $153^{\circ} 10' E.$, may refer to the same. Nothing more is known.

A *reef*, in lat. $20^{\circ} 30' N.$, long. $152^{\circ} 50'$, on the charts, has been several times repeated, and once as a *sandy bank*, once also in *East* longitude, which is probably erroneous.

† *Margaret Islands*, a whaler report, in $27^{\circ} 30' N.$, $145^{\circ} 40' E.$, are doubtless intended for Margaret Islands, but it adds nothing to their authenticity.

assumed is open to every doubt. But some whaler reports place a group of islands in lat. 25° 6' N., long. 145° 44' E., or 143° 44' E.

There are so many reports as to the existence of one or more groups hereabout, although some of them are manifestly erroneous, that it must be believed that there is reason for the assertions. There are no means of fully deciding about them.*

THE ARZOBISPO OR BONIN ISLANDS.

The Bonin Islands are the next to the northward. At the time of the opening of Japan to commerce they were made the subject of some remark as to whom they belong, and therefore a few words respecting this point may not be irrelevant. There can be but little doubt now that they are the Bune Sima or Bonin Sima, described by Mr. Klaproth and Abel Rémusat, in 1817, as being discovered by the Japanese, in 1675.

Krusenstern also states that they correspond well with the Ylas del Arzobispo of a work published in Manila many years previously. By right of discovery, therefore they belong first to Japan, and in the second place, probably, to Spain; the third visitor has been the subject of dispute.

Captain Coffin, of the *Transit*, of Bristol, in the employ of Messrs. Fisher, Kidd, and Fisher, discovered them September 12th, 1824 (not in 1825, as has been stated in this controversy). His nationality and flag have been disputed. He was well known to Mr. Arrowsmith, to whom he communicated his discovery, and other English geographers, who always considered that he was an Englishman.

Commodore Perry, in his correspondence and report to his government, and in his paper, read before the New York Geographical Society, speaks quite dubiously on this point. In the latter part of his work he says that he is an American, but does not allude to the account given by Mr. Reynolds, the projector (unacknowledged) of the United States' Pacific Exploring Expedition.

Captain Coffin saw the South group in 1824, as stated above, giving the name of Fisher Island to the largest, and Kidd Island to the westernmost;

* FORFANA, an island said by Galvaom to have been discovered by the ship *San Juan*, in 1543. There cannot be any doubt of its existence, though the position may be open to question. It is said to be 30 leagues E. $\frac{1}{4}$ N. of the Volcano Islands. This would give it lat. 25° 34', long. 143° 0', but it has not been found here.

Tree Island, lat. 26° 2' N., long. 145° 50' E., is called a *group of islands*, by whaler report, nearly in this position, and *Three Islands* by another and similar report, and again as a group of islands, a degree farther westward, or long. 143° 44'.

to two others he applied the names of South Island and Pigeon Island, and to the harbour he used he gave his own name. Commodore Perry, U.S.N., in 1854, doing what he so severely deprecates in others, has superseded some of these names, giving his own name to South Island, Plymouth to Kidd Island, and Newport to Coffin harbour. It may be stated that among other differences, Captain Coffin places the islands 70 miles to the eastward. In the following year (1825) Captain Coffin discovered the central group, and refreshed in Port Lloyd. Kater Island, "a lump of an island" as he calls it, was also discovered at the same time. It was taken possession of for England by Captain (afterwards Admiral) Beechey, who surveyed the group in 1827. They were afterwards visited by Captain (now Admiral) Quin, in H.M.S. *Raleigh*, who stayed here 10 days in August 1837. They have since been visited by several men-of-war, in H.M.S. *Larne*, in 1838, Captain (now Admiral) Collinson, in H.M.S. *Enterprise*, in 1851, and the U.S. Expedition in 1854.

It was colonised in 1830 under the direction of Mr. Charlton, our consul at the Sandwich Islands. The white settlers landed here June 26th, 1830, under Matteo Mazzaro, by birth a Genoese, and Millichamp, an Englishman.* With them were two Americans and one Dane, besides some natives of Oahu. Millichamp returned to England, and Mazzaro, it is said, is dead, so that at present, of the original settlers, the two Americans and two Pacific Islanders are all that remain. The population at the period of Captain Collinson's visit, amounted to 17 men, 11 women, 2 girls, and 18 runaway sailors, natives of Oahu; 26 children had been born (21 boys, 5 girls), one half of whom had died.

We cannot enter here into any speculation as to the sovereignty of these islands. It is manifest that the Japanese first discovered them, and of Europeans, the Spaniards have the primary claim. The scandalous outrages recorded by Captain Collinson to have been inflicted on the helpless settlers in 1849 and 1850, by the crews of some American vessels, robbing and destroying the property of the white men, and stealing their wives, aroused the strongest indignation.

The Japan Expedition has determined the geological character of the group to be volcanic; trappean rocks are the basis of the islands. Streams of lava yet are traceable, and basaltic columns appear. Earthquakes occur twice or thrice a year, and Port Lloyd, the principal harbour, appears to have been the crater of an ancient volcano, its entrance being a fissure in the cone. The scenery of the island is romantic and beautiful.

* Mazzaro and Millichamp's names appear in another part of the world. They were wrecked, with Goodridge on the Crozet Islands, in the Indian Ocean, in March, 1821, and figure in Goodridge's "Robinson Crusoe" account of their solitary residence there.

As has been stated above, they were surveyed by Captain Beechey in 1827, but the southern group was more particularly examined by Lieut. G. B. Balch, U.S.N., in the *Plymouth*, in 1853. From these accounts we give the following:—

The **PARRY GROUP** is the northernmost cluster, consists of small islands and pointed rocks, and has much broken ground about it, which renders caution necessary in approaching it. According to the survey it is about 9 miles in length N.W. and S.E., and its North extremity is in lat. 27° 44' 35" North, long. 142° 7' East.

Kater Island, North Rock in lat. 27° 31' N., long. 142° 12', is 8 miles southward of the Parry group. It is a small rocky island, with a conspicuous islet, the *Ears*, on its S.W. side.

The **BEECHEY GROUP** is the principal of the Bonin Islands. They have been thus named of the English surveyor. He thus describes it:—

The middle cluster consists of three islands, of which *Peel Island*, 4½ miles in length, is the largest. This group is 9½ miles in length, and is divided by two channels so narrow that they can only be seen when abreast of them. Neither of them are navigable for shipping; the northern on account of rocks which render it impassable even by boats, and the other on account of rapid tides and eddies, which, as there is no anchoring ground, would most likely drift a ship on the rocks. The northern island I named *Stapleton*, and the centre *Buckland*, in compliment to the professor of geology at Oxford. At the S.W. angle of Buckland Island there is a sandy bay, in which ships will find good anchorage, but they must be careful in bringing up to avoid being carried out of soundings by the current. It is named Walker Bay, after (the late) Mr. Walker, of the Hydrographical Office. The southern cluster is evidently that in which the whale-ship, commanded by Mr. Coffin, anchored in 1823, who was the first to communicate its position to this country, and who bestowed his name upon the port, as has been before mentioned. As the cluster was, however, left without any distinguishing appellation, I named it after Francis Bailey, Esq., late President of the Astronomical Society.

It was visited by the U.S. Japan Expedition, in June, 1853, and the narrative of Dr. Hawks gives us the best account of the islands. Speaking of the Beechey group he says:—The islands of Bonin are high, bold, and rocky, and evidently of volcanic formation. They are green with verdure and a full growth of tropical vegetation, which crowds up the acclivities of the hills, from the very borders of the shore, which is, here and there, edged with coral reefs. The headlands and detached rocks have been thrown by former convulsions of nature into various grotesque forms, which assume to the eye the shape of castle and tower, and strange animals, of monstrous size and hideous form. Numerous canal-like passages were observed opening in the sides of the rocky cliffs, which had almost the appearance of being

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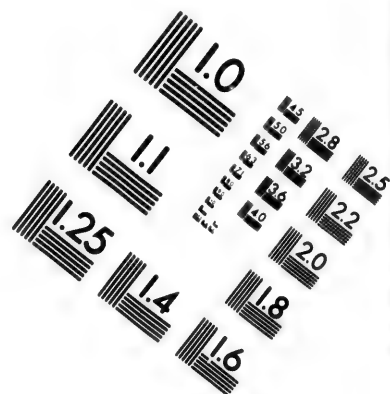
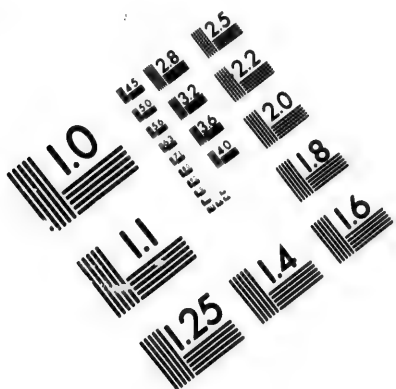
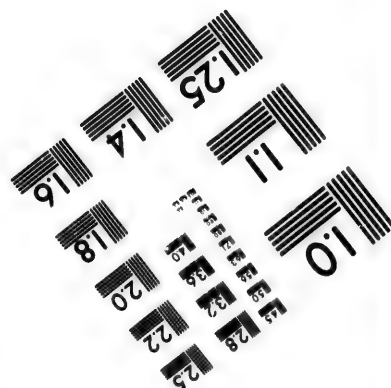
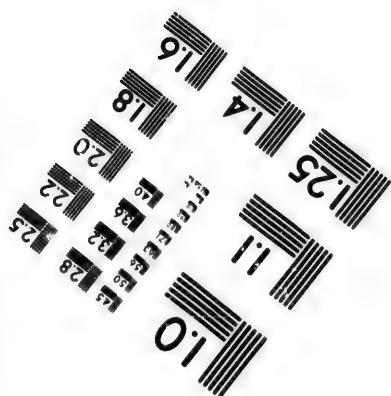
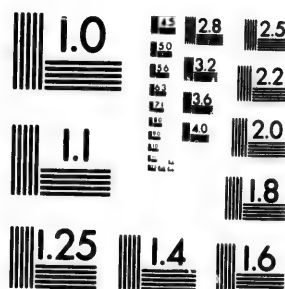


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hewn out with the chisel, but which were evidently formed in the course of volcanic changes, when the rock flowed with liquid lava, and found issue in these channels, which the torrents that came down the sides of the mountain in the rainy season toward the sea have worn smooth by constant attrition. Some of these dykes, or canal-like passages, less affected by time and the washing of the water, still retain their irregular formation, which has so much the appearance of steps that the observer, as he looks upon them, might fancy they had been cut by the hand of man in the solid rock, for the purpose of climbing the mountain. On the southern Head, as it is called, within the harbour of Port Lloyd, there is a very curious natural cave or tunnel, which passes through the basaltic rock, from the southern Head to the beach on the other side. The entrance has a width of about 15 feet, and a height of 30 feet, but the roof within soon rises to 40 or 50 feet, where it has so much the appearance of artificial structure, that it may be likened to a builder's arch, in which even the keystone is observable. There is sufficient water for a boat to pass from one end to the other. There are several other caves or tunnels, one of which is at least 50 yards in length, and passes through a headland bounding the harbour. This is constantly traversed by the canoes of the inhabitants.

The geological formation of the island is trappean, with its various configurations and mineralogical peculiarities; columnar basalt appears, and hornblende and chaledony are found. There are all the indications of past volcanic action, and the oldest resident of Peel Island stated that two or three tremblings of the earth, giving evidence of a liability to earthquake, are experienced annually even now.

Peel Island is the principal of the cluster, and on it are two bays, one to the S.E., which is clear and deep, except towards the head, where anchorage may be had; but of course it is open to the prevailing winds. Its head runs nearly up to that of Port Lloyd, which is on the N.W. side of the island, and facing the West.

The island is $4\frac{1}{2}$ miles long, and tolerably high—the hills rising in some places by gentle slopes, in others abruptly by steep ascents; the elevation of the *paps* near the North end is respectively 879 and 886 feet. Almost every valley has a stream, and the mountains are clothed with trees, among which the *areca oleracea* and fan palms are conspicuous. The volcanic origin of the island is clearly manifest from the existence of ancient craters, and basaltic dykes passing through beds of sand, scoria, and cinders.

Off the S.W. end of Peel Island is *Knorr Island*, with several islets and rocks in its vicinity, and northward of Knorr Island are the conspicuous *Sail Rocks*, 60 feet high; $1\frac{1}{2}$ mile northward of *Sail Rock* is the entrance to Port Lloyd.

The promontory stretching from the N.W. end of Peel Island and forming the North and West sides of Port Lloyd, is 739 feet high towards its centre,

North Pacific.

and 594 feet towards its southern end. The seaward shores are bold and perpendicular. Westward (southerly) of the latter summit a reef extends out to the distance of $1\frac{3}{4}$ cables from the shore; and rather more than a cable's length to the northward of this, and at the distance of 2 cables from the shore, is an outlying rocky patch, having only 6 to 8 feet water on it, with deep water all round. There is also a reef of rocks off the N.W. point of Peel Island.

Port Lloyd.—This harbour has its entrance conspicuously marked by a bold high promontory (southern head 492 feet high) on the southern side, and a tall quoin-shaped rock (square Rock, 260 feet high) on the northern side. It is nearly surrounded by hills, and it would appear to have been at one time the crater of an active volcano.

At the upper part of the port there is a small basin, formed by coral reefs, kept open by streams of water running into it, and which, in consequence of there being 10 fathoms water all over it, is named *Ten-fathom Hole*. It is conveniently adapted for heaving a ship down, and on the whole a most desirable place of resort for a whale ship.

In most of the small bays in the harbour there are coral reefs and ledges.

Two cables south-eastward from Square Rock, and 3 cables southward of the rocky head on the North side of the entrance, are two dangerous shoal patches, steep-to, and awash with a smooth sea; they can be easily seen from aloft, however, even when there is no swell on. There is also a coral rock about a cable's length North from the northern point of Southern Head, on which are 8 feet water, and there are breakers 3 cables southward of the South side of the same head. Southern Head is an island at high water.

Directions for Entering.—Having ascertained the situation of the port, steer boldly in for the Southern Head, taking care not to bring it to the northward of N. 47° E., true, or to shut it in with two paps on the N.E. side of the harbour, which will be seen nearly in one with it on this bearing. In this position they are a safe leading mark. To the southward of this line there is broken ground.

If the wind be from the southward, which is generally the case in the summer time, round the South bluff at the distance of 200 yards, close to a sunken rock, which may be distinctly seen in clear weather. Keep fresh way upon the ship, in order that she may shoot on end through the eddy winds, which baffle under the lee of the head;* and to prevent her coming round against the helm, which would be dangerous. The winds will at first break the ship off, but she will presently come up again; if she does not, be ready to go about, as you will be close upon the reefs to the northward,

* Keep the top-gallant clewlines in hand.

and put the helm down before the South end of the island, off the port to the westward, comes on with the high square rock at the North of the entrance.

If she comes up, steer for a high *Castle Rock* at the E. end of the harbour, until a pointed rock on the sandy neck to the eastward of the South headland comes in one with a high sugar-loaf shaped grassy hill to the southward of it. After which you may bear away for the anchorage, taking care not to open the sugar-loaf again to the westward of the pointed rock.* The best anchorage, Ten-fathom Hole excepted, which it is necessary to warp into, is at the northern part of the harbour, where the anchor is marked on the Admiralty plan.

In bringing up, take care of a spit which extends off the South end of the small island, near Ten-fathom Hole, and not to shoot so far over to the western reef as to bring a rock at the outer foot of the South bluff in one with some black rocks, which will be seen near you to the south-westward. The depth of water will be from 18 to 20 fathoms, clay and sand. If the wind be from the northward, beat between the line of the before-mentioned Sugar-loaf and Pointed Rock westward, and a North and South line from the Castle Rock to the eastward. This rock, on the western side, as well as the bluff to the northward of it, may be shaved, if necessary. The hand-leads are of very little use in beating in here, as the general depth is 20 or 24 fathoms.

The best watering-place is in Ten-fathom Hole. It is necessary to be cautious of the sharks, which are very numerous in this harbour. It is high water, full and change, at 6^h 8^m; springs rise 3 feet. The station on the North side of Ten-fathom Hole is in lat. 27° 5' 35" N., long. 142° 11' 31" E.

Admiral Collinson, C.B., was here in 1851, and he says, that in making the island from the southward, he experienced a difficulty in discovering the remarkable quoin mentioned by Capt. in Beechey as the mark for the harbour on the South side, being under the shadow of the high land at the back. No difficulty, however, can be experienced by a stranger making the harbour from the southward, as the bold bluff on the South side is sufficiently remarkable, and the two paps which Captain Beechey gives as a leading mark for clearing the rocks outside of the harbour will sufficiently denote its position. Besides that, among the detached rocks to the southward, are two pinnacles, and over the remarkable quoin, on the North side as you enter, is a triple peak. We shot in close under the bluff, but did not see the shoal off it (it will not do, therefore, for vessels to trust to the eye to pick this danger up), and then had baffling winds until we opened South Bay, when we edged

* This rock is white on the top with birds' dung, and looks like an island.

away to the North, and came to off the entrance to Ten-fathom Hole in 25 fathoms; a better berth will be found a cable's length closer to the reef on the West side.

Fitton Bay, at the S.E. angle of Peel Island, enclosed by perpendicular rocks, is $1\frac{1}{2}$ mile deep, and nearly a mile wide at the entrance. There is anchorage at the upper end in 17 fathoms, sand, at the distance of 2 cables from the shore, secure from all winds except those from S.E. On the North side of the entrance there is a large and conspicuous islet, connected to the North bluff of the bay by a reef on which are several small rocks. Outside the harbour there are also some sunken rocks to the southward of the entrance, on which account ships should not close the land in that direction, so as to shut in the two paps (at the N.E. angle of Port Lloyd) with the South bluff of the bay; with these objects open there is no danger. At the upper end of the bay, on the West side, there is a small and narrow cove, with 6 fathoms water at the entrance.

Fitton Bay is frequently visited by whalers for wood and water.

From a point on the East side of Peel Island a reef of rocks stretches to the northward, terminating at a small islet in lat. $27^{\circ} 5\frac{1}{2}'$ N.; one-third of a mile to the north-westward of the islet is a detached patch and rock. The channel between Peel Island and Buckland Island, to the northward, is unsafe. Nearly fronting this channel, one mile westward of the West entrance, is *Goat Island*, in lat. $27^{\circ} 7'$ N., about 300 feet high, in the vicinity of which are several rocks and small islets; one-third of a mile to the southward of Goat Island there is also a small group of very low islets.

Buckland Island, to the North of Peel Island, and the central one of Beechey group, is $3\frac{1}{2}$ miles long N.W. and S.E. At the S.W. angle of the island, close to the opening of the channel between it and Peel Island, is a small sandy bight named *Walker Bay*, in which ships will find good anchorage; but they must be careful in bringing up, to avoid being carried out of soundings by the current. The islet on the West side of this bay is connected to the main by the reef. Westward of the West point of Buckland Island, and five-eighths of a mile north-westward of the islet just mentioned, is *Little Goat Island*, which is also connected to the main by a reef. The channel between Goat Island and Little Goat Island is over half a mile wide, and safe by not borrowing too much towards either shore.

Stapleton Island, the northernmost of the Beechey group, is, like the others, of volcanic origin. It has a varied surface of plain, hill, and valley, with large tracks of fertile lands. There is a small bay on the western side with apparently deep water, and surrounded by rocks and mountains, varying from 800 to 1,500 feet in height, which protect it from the S.E. typhoons.

BAILEY GROUP, the southernmost of the Bonin Islands, was thus named

by Beechey. The respective islands of the cluster were named by their discoverer, Capt. Coffin, as hereafter stated. "With the proverbial modesty and justice of . . . surveyors, Commodore Perry replaced the original names by his own for the southernmost, and of his officers to the others."

Fisher Island was named by Coffin in 1823, after one of his employers. It is called *Hillsborough Island* by Commodore Perry. A survey was made by Lieut. G. B. Balch, U.S.N., in 1853. He of course uses the *new* names applied by the surveyors. In taking his descriptions we have restored the original names, adding the recent ones in parentheses.

Fisher Island, the largest of the Coffin group, is $7\frac{1}{2}$ miles in length, by about $1\frac{1}{2}$ in breadth, and 1,471 feet high. The greater portion of it is rocky and hilly, and unsuited for agricultural purposes. That portion of it which could be cultivated is a black loam, and produces sweet potatoes, yams, taro, and Indian corn, bananas, pine-apples, water melons, and limes. Sweet potatoes form the staple support of the few inhabitants of the island. Hump-back whales resort to these islands from November till May, during which time they are calving. Turtles are found in abundance in season, and are salted down by the inhabitants in lieu of beef.

Close to the northernmost point of Fisher Island is *Devil Rock*, from which a reef stretches nearly a mile to the north-westward. At the distance of three-quarters of a mile south-westward of the rock, is the N.W. point of the island, off which is *Sugar-loaf Rock*, with dangerous rocks and reefs stretching some distance seaward. On the West side of the island, midway between its extreme points, are two small indentations in the coast-line, off which are two small islets. Half a mile to the southward of the southern indentation is *Pyramid Rock*, close to the shore; nearly a mile south-westward from the Pyramid is *Painted Rock*, three-quarters of a mile from the coast, the intervening area being encumbered by rocks (one of which is arched) and by reefs; these form part of the northern boundary of *Coffin Harbour* (New-port), an open bay on the West side of Fisher Island, near its South end.

Stretching to the south-westward from the south-west point of Fisher Island is a continuous line of reefs and islets, terminating in a long but narrow island. The outermost extreme of this island with its outlying reefs, is $2\frac{1}{2}$ miles from the S.W. point of Fisher Island; thence a rocky patch to the north-westward, in the direction towards *Mid-channel Rock*, which rock is also surrounded by rocky patches; half a mile to the northward of Mid-channel rock is *Kidd* (Plymouth) *Island*, which is a mile long, N.N.E. and S.S.W., and half a mile wide. Kidd Island fronts and partially shelters New-port; the channel between it and the main island (Fisher) on the North is deep and $1\frac{1}{2}$ mile wide; that to the South, between Kidd Island and Mid-channel Rock, is less than half a mile in width, but safe (having 10 fathoms) by not borrowing too much towards the rock. Whether the chan-

nel between Mid-channel Rock and the island to the south-eastward is accessible is uncertain, it appears by the chart to be considerably encumbered with rocky patches which narrow the passage.

To the S.S.E. of Fisher Island, at the distance of 3 miles, is *Kelly Island*, 1 mile long East and West, and half a mile wide. To the north-eastward of Kelly Island, at the distance of half a mile, is another small island, with a reef off its East extremity. Several islets and a reef of rocks also stretch some distance northward from the N.W. point of Kelly Island to the centre of the easternmost island, making the channel between the two impassable. Off the West end of Kelly Island there is a small rock, and the depth is 25 fathoms.

West of Kelly Island, at the distance of 2 miles, is *South (Perry) Island* 1½ mile long N.E. and S.W., and about half a mile wide. The channel between South Island and the island to the North is a mile wide; the islets (*Needles*) in the channel near the North side of South Island have rocky patches around them; there is also a rocky patch three-quarters of a mile south-eastward from South Island, opposite two rocks near the shore.

Coffin Harbour.—With the exception of this and a small cove just to the northward of it, there is no place on the shores of any of the islands suitable for a coal depot; nor can either be recommended as places suitable for such a purpose. They are both open from S.W. to N.W., and the holding ground is not good, being sand and rocks. Vessels could, however, always get to sea on the approach of a gale, as there are two safe passages, which are very plain.

In the centre of the harbour, there appears to be no bottom with 24 fathoms.

It is high water in Coffin Harbour, at full and change, at 11^h 32^m, and the rise of tide is 3½ feet.

VOLCANO ISLANDS.

This remarkable group of three islands lies to the southward of the Bonin Islands, at from 95 to 150 miles distance, and forms a continuation of that line of volcanic fires which show themselves at intervals from Kamtchatka southward, through the eastern part of Japan, and the range of islets to the S.E. of Nipon, and then in the Bonin Islands.

These three islands were discovered in 1543 by Bernardo de Torres, and received their name from the volcano on the central one. There can be no doubt of their being the same as the *Sulphur Islands* of Captain King, in 1779. They were also seen by Captain Krusenstern, in the *Nadiejeda*, in 1805. On the Spanish charts the northern island is called *San Alessandro*; the centre, *Sulphur Island*; and the southern, *San Augustino*. Espinosa says

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that the southernmost was seen in 1804, by the Spanish corvette *La Concepcion*, and named *San Dionisio*, a name by which, according to him, it has always been distinguished by the Spanish navigators.

San Augustino (or *San Dionisio*), the southernmost, is a single mountain of a square form, flat at the top, and 396 feet high. Admiral Krusenstern's observations, and he was near it for two days, place it in lat. 21° 14', long. 141° 20', which is 7' 30" South of that given by Captain King; so that unless a fourth island lies in that latitude, a thing most improbable, we must suppose that the error arose from the distance at which it was seen in 1779.

Sulphur Island is the central one. It is about 5 miles long in a N.N.E. and S.S.W. direction. The South point is a high, barren hill, flattish at the top, and when seen from the W.S.W. presents an evident volcanic crater; the soil of which its surface is composed exhibited various colours, a considerable part of which was conjectured to be sulphur, both from its appearance and the strong sulphureous smell perceived as the point was approached. Some on board the *Discovery* thought they saw steam rising from the top of the hill. A low, narrow neck of land connects this hill with the South end of the island, which spreads out into a circumference of 3 or 4 leagues, and is of moderate height. The part near the isthmus has some bushes on it, and has a green appearance, but that to the N.E. is very barren and full of large detached rocks, many of which were exceedingly white. Very dangerous breakers extend 2½ miles to the East and 2 miles to the West, off the middle part of the island, on which the sea breaks with great violence. The position of Sulphur Island, according to Captain King, identical with that of Admiral Krusenstern, is lat. 21° 48', long. 141° 13'.

San Alessandro, or the North island, is also a single mountain of considerable height, like the southern one. It is peaked, and of a conical shape, lat. 25° 14', long. 141° 11'.*

From these islands the volcanic energies appear to diverge into several directions to the S.S.E. towards the Mariana Islands, well known as a range of volcanic summits, the intervening space being marked with two or three small reefs, whose position, however, are open to some doubt.

It also appears to continue to the S., towards the Pelew Isles, for on Dec. 25, 1848, Mr. Lindsay, of the schooner *Amelia*, discovered an apparently volcanic island or rock, in lat. 19° 20' N., long. 141° 15½' E. To the S.W. there

* To the southward of the Volcano Islands are the following doubtful announcements:—
A reef, from whaler report, is twice announced as in mean lat. 22° 6' N., long. 142° 27' E.
Peru, *Parce*, or *Three Islands*, in lat. 21° 20' N., long. 141° 40' E, may be Euphrosyne Rock.

Valetta Reef, lat. 21° 0' N., long. 143° 0' E., is not known.

are evidences of a submarine volcanic action in the rock "like a sail," seen by the Lieut. commanding the *Euphrosyne*, May 2, 1851, and by the commander of the *Linda* also in 1851; lat. 21° 43', long. 138° 30' E. Beyond this we have the dangerous Vela, Parece Vela, or Douglas or Bishops Rock—two shoals often announced as fresh discoveries, and a rock discovered by Meares of fur-dealing notoriety. A singular phenomenon was experienced by Lieut. Jones, commanding the U.S. sloop of war *St. Mary's*, in January, 1850, when in lat. 20° 56' N., long. 134° 45' E., the wind suddenly died away, the sea became troubled, the air heated, and a sulphurous smell became very apparent. This lasted about twenty-five minutes, and then the wind came out as before.

These last are further alluded to presently.

DISAPPOINTMENT or **Rosario Island** lies to the westward of the Bonin Islands. It was seen and named in the *Nautilus* in 1801, and again on September 25, 1813, in the Spanish corvette, *La Fidelidad*. It was also seen by Captain M. Quin in H.M.S. *Raleigh*, August 11, 1837, in lat. 27° 13' N., long. 140° 46' E. Commodore Perry, U.S. Japan Expedition, places it in 27° 15' N. and 140° 56' 30" E., or mean 27° 14' N., 140° 52' 15" E.

The island is about three-quarters of a mile long (N.E. by N. and S.W. by S.), and the highest point, near the centre, 148 feet. Around it are several detached rocks, two of which are a short distance off its extreme points; and a reef extends one-eighth of a mile to the southward of the southernmost one. It is of volcanic formation, bold, broken, rugged, generally barren, and apparently unsuceptible of cultivation, but there are some small patches of green about the top. The surf breaks heavily all around it, and landing is impracticable. From a distance of 10 miles it appears as two islands.

LINDA or **EUPHROSYNE ROCK** is a remarkable pinnacle seen by the *Linda* and the *Euphrosyne* in 1851. It was on each occasion said to look like a ship under sail. The mean lat. is 21° 43½' N., long. 140° 50' E.

Meares Reef is said to lie in lat. 21° 0' N., long. 136° 45' E.

DOUGLAS REEF, or **Parece Vela**.—Douglas Reef was discovered on September the 15th, 1789, by Captain Douglas, and is 5 miles in extent in a W.N.W. and E.S.E. direction, in lat. 20° 37' N., long. 136° 10'. These rocks, and those seen by Captain Bishop in the *Nautilus*, in 1796, in lat. 20° 15', long. 136° 54', are probably the same as those named Parece Vela and Vela, by the older Spanish navigators. The rocks seen by the *Nautilus*, like all bare rocks, appeared like a vessel under sail, and thus might have been called Vela (a sail), or Parece Vela (a sail in sight!). On Anson's chart these hold the same relative position as the Douglas and *Nautilus* Reefs, and

therefore the name of Parece Vela has been added to the discovery of Capt. Douglas, and Vela to that of Capt. Bishop.

An American discovery has been announced as lying half a degree to the North of Douglas Reef; but its true character and position have been well ascertained. Capt. B. Sproule, of the *Maria*, examined it in his boat, March 18, 1847. He says:—I found it to consist of a narrow perpendicular wall of coral, enclosing an oblong lagoon of deep water. I rowed along its whole length, which I should say was 2 miles by three-quarters of a mile wide at one-third from the eastern point. Sharp heads of pointed rock appeared frequently through the surf; and one isolated rock of about 12 feet high and 15 feet broad rose from the smooth water of the lagoon, near its western extreme, with the rock bearing E.N.E. I put the boat through the narrow channel in the reef of not more than 3 feet;—this was the only opening I saw, and had it not been very still under the lee, this would never have shown. High breakers were rolling over the northern and north-eastern parts. When the boat was on the wall I had 3 ft. water; by packing two lengths, 17 fathoms; two lengths more, no bottom with a whole line. The South side is nearly straight, in an E. by S. $\frac{1}{2}$ S. and W. by N. $\frac{1}{2}$ N. direction. The rock when seen from the ship, 3 miles off, appeared exactly like a boat's tanned lug. Its position is lat. $20^{\circ} 31' N.$, long. $136^{\circ} 6' E.$ Nothing can be more dangerous than this reef, from its extent; its neighbourhood ought to be approached with the greatest caution in dark and blowing weather; and in the months of November, December, January, and part of February, it blows very hard, with thick weather; but in fact, all the passage from the Sandwich islands to the coast of China requires the greatest caution. Innumerable sperm whale were playing about the reef, and the sea was perfectly alive with fish of many descriptions. Sharks were also very numerous.

It was also seen by Captain Steele, of the *Sebastian Cabot*, in 1867, as a reef extending in a W.N.W. and E.S.E. direction for 5 miles. There are two isolated rocks near its western end; the westernmost about 20 ft., and the other about 15 ft. above water, distant from each other about a quarter of a mile. It is a very dangerous reef in stormy or cloudy weather, as it can be seen but a very short distance; the position of the westernmost rock is about lat. $20^{\circ} 28' N.$, long. $136^{\circ} 17' E.$

Captain Ludwig Saabye, of the *Benjamin Howard*, saw it and the breakers plainly from the deck, distant about 6 miles. He considered it very dangerous. Lat. $20^{\circ} 25' N.$, long. $136^{\circ} 2' E.$, from good observations.

The probably correct position will therefore be about lat. $20^{\circ} 30' N.$, long. $136^{\circ} 10' E.$ *

Bishop, Nautilus, or Vela Rocks, were discovered by Captain Bishop,

* At about 80 miles W. by N. from this the submarine volcanic evidences noticed on page 888 were felt in 1853.

in the *Nautilus*, in 1796. They do not appear to have been seen since. Lat. 25° 20', long. 131° 15'.

Kendrick Island was seen by an English captain of that name. It is low, and about 6 miles long; lat. 24° 35', long. 134° 0' E. A small, low island was seen by the brig *Hannah Cheever*, in 24° 33' long. 132° 40', about midway between the foregoing and Rasa island. It may refer to either, or it is possible that there may be but one island.

RASA ISLAND is a small, low island, covered with bushes, and surrounded with rocks, 4 or 5 miles long in a N.W. and S.E. direction. It was called *Rasa* (flat) on board the Spanish frigate *Magellan*, in 1815, but it had been seen in 1807 by the French frigate *La Canonnière*. The lat. given was 24° 26' 40", and the mean of the two longitudes 130° 40' E. It has been also seen by several others. Of these may be noticed Mr. Symington, in the *Lancashire Witch*, in 1856, who places it 24° 26' N., long. 131° 5½' E. Captain Dixon, of the *Joseph Sprott*, says that it is 3½ miles long S.S.W. and N.N.E., generally low, the highest part about 220 ft. high, covered with very short brushwood, and having very deep water all along its western side; lat. 24° 30' N., long. 131° 11' 45" E. Besides these accordant statements may be added the report of Capt. Norville, of the brig *Argyle*, who says it is a mile long, with a reef projecting from its northern side nearly a mile, and a rock to the East near the shore, lat. 24° 23' N., long. 131° 0' E. The barque *Aurora* says it is 5 miles long North and South, lat. 24° 29' N., long. 131° 12' E. The mean of these positions may be taken as 24° 27' N., long. 131° 1' 50".

BORODINO ISLES were discovered by Lieutenant Ponafidin, in 1820. He places them in lat. 25° 56', long. 131° 15'.

They have been surveyed by Commodore Perry, of the U.S. Japan Expedition. They were made on the 22nd of June, 1854, directly ahead, and were found to be two in number, situated 5 miles apart, and lying in a N.N.E. and S.S.W. direction. They appeared to be of coral formation, but of great antiquity, as trees of considerable size crowned the uplands, the most elevated part of which may have been 40 ft. above the level of the sea. The navigation in the immediate neighbourhood seemed free of danger, but no indentations were seen in the surrounding shore which might afford safe anchoring places. No signs of people were discovered, and it is presumed that the islands are uninhabited. The position of the extremity at the South of the southern island was estimated to be in lat. 25° 47', and long. 131° 19' E.*

* The following will conclude the list of doubtful islands.

South Rowan Island, a whaler report, in lat. 27° 4' N., long. 139° 50' E., is doubtless intended for Rosario Island to the eastward.

ISLANDS SOUTH-WEST OF JAPAN.

On page 598 we have given descriptions of the south-western coasts of Kiusiu and of Cape Chichakoff. The islands southward of it have been partially examined by French officers, and adapted to the Japanese charts and names.

TANEGA SIMA the largest island to the S.E. off this cape, is 20 miles long; but little is known of it. It is said to be level and covered with trees. It appears to extend from lat. $30^{\circ} 22'$ to $30^{\circ} 43'$, and from long. $130^{\circ} 54'$ to $131^{\circ} 5'$ E. The northern part is low, with smooth, rounded, undulating hills. There is the outline of a good harbour on its western side.

YAKUNO SIMA, is 14 miles W.S.W. of Tanega. Its highest peak, *Mount Motomi*, is 5,848 ft. high, in lat. $30^{\circ} 21'$ N., long. $130^{\circ} 29'$ E., and shows double from the eastward. The island is about $12\frac{1}{2}$ miles long North and South, but it has not been examined.

Yerabu Sima (*Julie Island*) has an active volcano, 2,067 ft. above the sea. Its highest peak is in lat. $30^{\circ} 27'$ N., long. $130^{\circ} 11'$ E. The island is about 6 miles long, E.S.E. and W.N.W., and its greatest breadth 3 miles.

Scriphos or Omuru Rock is marked as under water, in lat. $30^{\circ} 44'$ N., long. $130^{\circ} 45'$ E.

Take Sima (*Apollos Island*) is comparatively low, and about 2 miles in circumference; its centre is in lat. $30^{\circ} 48'$ N., long. $130^{\circ} 24'$ E. A rocky spit extends about a quarter of a mile from the East point of Take Sima.

Iwoga Sima (*Volcano Island*) is an active volcano; its highest peak, 2,345 ft. above the sea, is in lat. $30^{\circ} 42'$ N., long. $130^{\circ} 17'$ E. Some reefs extend about three-quarters of a mile from the eastern points of Iwoga Sima.

Powhattan Reef.—This dangerous reef, in lat. $30^{\circ} 41'$ N., long. $130^{\circ} 19'$ East, was discovered by the U.S. frigate *Powhattan*, in January, 1860. From the centre rock, about 18 ft. above the sea, the S.W. point of Iwoga Sima bore N.W., the East point N. $\frac{1}{2}$ W., and the East point of Take Sima N.E. $\frac{1}{2}$ N.

Rosa Island, a whaler report, in lat. $24^{\circ} 25'$ N., long. $138^{\circ} 56'$ E., is not known; it may be an error for long. $130^{\circ} 56'$ E., and so refer to *Raza Island*, which is probable.

Dolores Island, lat. $23^{\circ} 50'$ N., long. $134^{\circ} 12'$ E., is not known.

A reef, in lat. $23^{\circ} 20'$, long. $131^{\circ} 15'$ E.

Akin Reef or *Shoal*, reported by Captain Akin, of the ship *Winthrop*, to be a mile long N.E. and S.W., with but few breakers on it in fine weather. Lat. $20^{\circ} 37'$ N., long. $132^{\circ} 2'$ E. It should be observed that several well-known ships have passed over its position.

A shoal, in $26^{\circ} 58'$ N., $131^{\circ} 36'$ E., was not found by Capt. Marsh, of the *Viscount Sandon* in 1851.

Abre-ojo, lat. $22^{\circ} 0'$ N., long. $129^{\circ} 15'$, from the old Spanish chart, has not been found.

Amsterdam Island, $25^{\circ} 25'$ N., $131^{\circ} 0'$ E., may be Boredino Island.

Other rocks were seen awash, or a few feet above water, stretching out about three-quarters of a mile from the centre rock.

Trio Rocks are three distinct islets of about an equal height; the centre islet, 223 feet above the sea, is in lat. 30° 45' N., long. 130° 5' E.

KURO SIMA or *Sta. Clara* rises to the height of 2,132 feet; its centre is in lat. 30° 50' N., long. 129° 55' E.*

The *Ingersoll*, *Morrison*, or *Larne Rocks*, eight in number, extend N.E. and S.W. about 5½ miles: the highest, 446 ft. above the sea, is in lat. 30° 51' N., long. 129° 26' E., and visible in clear weather at 25 miles.

THE LINSCHOTEN ISLANDS.

A line of volcanic islands extends 120 miles S.W. of Yakimo Sima. They were entirely omitted on modern charts, but they are clearly shown in the illustration to the third book of the "Voyage ofte Schipvaert van Jan Huygen van Linschoten" (of Enkhuyzen), published at Amsterdam in 1595-6. Several particulars of the adjacent islands are given in this work, but there was some difficulty in applying them. In August, 1845, Sir Edw. Belcher, H.M.S. *Samarang*, first brought them to notice again. On August 13th, he landed on one of these *terra incognita*, the same on the 14th, and met with a disaster. The islands were (nearly) all named and placed on his charts.

Contre-Amiral Cécille examined them in the French corvette, *La Sabino*, and he gave them a second set of names, calling the range the *Cécille Archipelago*. The native names have been ascertained, and thus they possess three distinct sets of designations, which, for distinction sake, we must repeat here. The first the native, second the English, third the French.

Blake Reef (Lapelin Rocks) consists of several distinct islets and rocks, extending about 3 miles in a N.E. and S.W. direction; the highest islet, 90 ft. above the sea, is in lat. 30° 5' N., long. 130° 3' E.

Kutsino Sima (Jerabout or Alcmene), is 2,116 ft. above the sea; highest part is in lat. 29° 59' N., long. 129° 55' E.

Kohebi Sima (Forçade Rock), 984 ft. above the sea, is in lat. 29° 53' N., long. 129° 36' E.

Hebi Sima (*Dundas* or *St. Xavier*) rises to the height of 1,820 ft. The peak is in lat. 29° 55' N., long. 129° 32' E. There is a small islet off its N.W. face.

* This small and lofty island was one of the marks used by the "Portingales" in sailing from Macao to "Langasque" or Nagasaki in early days. It is frequently mentioned by Linschoten (anno. 1596), and marks are given to distinguish it from Merc-sim. (As sets Irmaas), the other landfall.

NAKA SIMA (*Pinnacle* or *Pacifique*) is 3,287 ft. above the sea; its peak is in lat. $29^{\circ} 53' N.$, long. $129^{\circ} 50' E.$

Fira Sima (*Disaster* or *Victorieuse*), lying W.N.W. of Suwa Sima, is 879 ft. high, and in lat. $29^{\circ} 41' N.$, long. $129^{\circ} 31' E.$

SUWA SIMA (*Volcano* or *Archimède*), is an active volcano, 2,805 feet high, in lat. $29^{\circ} 38' N.$, long. $129^{\circ} 42' E.$

Akuisi Sima (*Samarang* or *Acoucheki*), 2,184 ft. above the sea, is in lat. $29^{\circ} 27' N.$, long. $129^{\circ} 35' E.$; a small islet lies off its N.W. face.

The **Simago** (*Cooper* or *Sabine* group) are four small islets, the highest of which, 738 ft. above the sea, is in lat. $29^{\circ} 13' N.$, long. $129^{\circ} 19' E.$ The easternmost islet bears from it about E. $\frac{1}{2}$ N. 3 miles.

TOKARA SIMA (*Pennell* or *Toukara*), 885 ft. above the sea, is in lat. $29^{\circ} 8' N.$, long. $129^{\circ} 11' E.$

YOKO SIMA (*Oyle* or *Cleopatre*), rising to the height of 1,623 ft. above the sea, is an extinct volcano, the highest part of which is in lat. $28^{\circ} 49' N.$, long. $128^{\circ} 59' E.$; there is a small islet, *Kaminone* (*Royalist*), about a mile northward of it.

THE LU-CHU OR LOO-CHOO ISLANDS.

A group of very irregularly formed islands succeeds the Linschoten group to the southward. The principal islands were well known, but it may be observed that Oho-sima (Harbour or Bungalow Island) has been generally omitted from the charts, and this has led to much confusion.

Sandon Rocks were discovered by the ship *Viscount Sandon*, 8th December, 1850, on her passage from Singapore to Shanghai. The highest rock is about 20 ft. above the sea, with two low detached rocks to the westward, and a reef between them. At a quarter of a cable's length from their N.W. side were 12 fathoms water, and at half a mile to the N.W. 15 to 22 fathoms with overfalls over an uneven coral bottom. No other dangers were visible. Their position is given as lat. $28^{\circ} 44' N.$, long. $129^{\circ} 38' E.$

OHO SIMA, or *Harbour* or *Bungalow Island*, is the largest of the chain of islands lying between Great Lu-chu and Japan. It is about 30 miles in length, N.E. and S.W., is high, well cultivated, and, from the number of villages seen along the coast, must contain a large population. There are two peaks on its South end, 1,674 and 1,420 feet respectively above the sea.

This island was partially surveyed by the American squadron in 1856. The outline of its coasts appears much broken, and deeply indented with numerous bights, most of which are very bold. Wood and water are good and plentiful; but refreshments scarce. The inhabitants are timid and

harmless. The North end is high, and being connected with the main part of the island by a narrow, low isthmus, it has the appearance, on some bearings, of being isolated. Foul ground appears to extend about $2\frac{1}{2}$ miles N.E. by E. from the North end, and two rocks to rise from it, the northern of which is about 80 feet high. North extreme of the island, lat. $28^{\circ} 31' 40''$ N., long. $129^{\circ} 40' 12''$ E.; South extreme, lat. $28^{\circ} 6' 30''$ N., long. $129^{\circ} 22'$ E.

The South end of the island is separated from *Katona Sima* by a narrow channel, in some places not more than half a mile wide. At its western entrance is *Vincennes Bay*, a small bay formed at the North end of *Katona Sima*.

By three days' observations in Vincennes Bay, it was high water, full and change, at 7^h 30^m, and the rise and fall $5\frac{1}{2}$ feet.

Kikai Sima, lying about 15 miles S.E. of the North end of Oho Sima, is moderately high, about 7 miles in length, N.N.E. and S.S.W., and inhabited. The summit (867 feet high), is in lat. $28^{\circ} 18'$ N., long. $129^{\circ} 57\frac{1}{2}'$ E.

Germantown Reef.—The U.S. ship *Germantown*, 23rd March, 1859, when beating along the S.E. side of Oho Sima, struck on a coral reef said to lie in lat. $28^{\circ} 16'$ N., long. $129^{\circ} 58'$ E. From the shoalest spot found, 6 feet, the highest terrace on Kikai Sima bore N.E. $\frac{1}{4}$ E. 6 or 7 miles. The reef is about a mile long in a N.N.E. and S.S.W. direction, and half a mile wide.

Another shoal spot was found lying North 2 miles from the centre of this reef, with apparently a clear passage between. Reefs were also seen from aloft, extending from 1 to 2 miles from the S.W. and S.E. points of Kikai Sima.

TOK SIMA of Siebold, or Crown Island of Broughton, in 1797, highest or southern peak, lat. $27^{\circ} 44'$ N., long. $128^{\circ} 59'$ E.; height, 2,461 feet. This island is 14 miles long North and South, and 7 miles East and West. Its northern peak is 2,034 feet above the sea. A village is built on its N.W. face.

Iwo Sima, or *Sulphur Island*, in lat. $27^{\circ} 51'$ N., long. $128^{\circ} 14'$ E. ($128^{\circ} 19'$ E. by Collinson), height 541 feet, is a volcanic mountain, still in action.

Yeirabu Sima of Siebold, or *Wukido* of Basil Hall, South peak, lat. 27°

* In the American chart *Germantown Reef* is placed $2\frac{1}{2}$ miles S. by W. $\frac{3}{4}$ W. from the S.W. extreme of Kikai Sima, or in lat. $28^{\circ} 14\frac{3}{4}'$ N., long. $129^{\circ} 53'$ E.; and there is another danger, named *Marsh Reef*, $1\frac{1}{2}$ mile southward of it.

21' N., long. 128° 31' 34" E.; height 689 ft. (lat. 27° 14' N., long. 128° 33' by Collinson in 1845).

Yori Sima, or Julo of Basil Hall in 1816, centre, lat. 27° 2' N., long. 128° 25' 24" E.

The Lu-chu or Liu-kiu islands, to the N.E. of the Meiaco-sima group, consist of one large island, Okinawa Sima, surrounded by smaller ones. The charts are derived from the Japanese chart, published by P. Von Siebold, in 1852, and therefore must not be implicitly depended on. They have been frequently visited and described, especially by Captain Basil Hall, who gives a long account of them; by Captain Beechey (voyage of the *Blossom*, vol. ii, chap. xvii.); Sir Edward Belcher, voyage of the *Samarang*, vol. ii.)

KERAMA ISLANDS.—To the westward of the South end of Okinawa sima are the Kerama islands, the Amakirrima of Basil Hall in 1816, and Kera Sima of Siebold. The group consists of four islands, Zamami, Accar, or Yakai of Siebold, Ghiruma and Twkaschi, of which all but the last are very small.

Captain Mathison, of H.M.S. *Mariner*, in 1849, states, "that in the chart of the Kerama islands there are six islands marked with apparently clear passages between them; whereas, as well as could be judged, there must be a greater number, and all the spaces between them appear filled with reefs and breakers. There is a shoal lying between the East Kerama island and the S.E. end of Okinawa sima, the breakers on which were clearly visible. Reefs also extend eastward about 5 or 6 miles from the N.E. point of Kume sima, the island lying to the W.N.W., on one of which the ship *Elizabeth* and *Henry* was lost."

The small coral islands lying off Napha-kiang road are called Tzee (Kei of Siebold), and Reef islands by Captain Basil Hall.

OKINAWA SIMA, or Great Lu-chu Island, is about 56 miles long N.E. and S.W., preserves a tolerably uniform breadth of about 10 or 12 miles, and is well inhabited. The North end is high and bold, with wood on the top of the hills. The N.E. coast is also abrupt but quite barren, and the N.W. side rugged and bare. The S.E. side is low, with very little appearances of cultivation. The South, S.W., and western coasts, particularly the two former, are of moderate height, and present a scene of great fertility and high cultivation, and here the mass of the population reside.

NAPHA-KIANG ROAD.—Napha, on the S.W. side of Okinawa, is the principal sea-port of the island, and perhaps the only one possessing the privileges of a port of entry. The inner, or Junk harbour, carries a depth of 2 to 3 fathoms, and though small, is sufficiently large to accommodate with ease the fifteen or twenty moderate sized junks which are usually found moored in it. The outer harbour, or Napha-kiang road, is protected to the eastward and southward by the main land, whilst in other directions it is

surrounded by merely a chain of coral reefs, which answer as a tolerable breakwater against a swell from the northward or westward, but afford, of course, no shelter from the wind. The holding ground is so good, however, that a well-found vessel could here ride out almost any gale in safety.

Abbey Point, the South extremity of the road, may be known by its ragged outline, and by a small wooded eminence, called *Wood Hill*, about 1½ mile South of it. The main land here falls back and forms a bay, which is sheltered by coral reefs extending northward from Abbey Point; they are however, disconnected, and between them and the point there is a channel sufficiently deep for the largest ship.

Nearly in the centre of this channel, outside withal, there is a coral bank named *Blossom Reef*, with a good passage on either side. The South channel, between it and Abbey Point, should be adopted with southerly winds and flood-tides, and the Oar Channel, between Blossom and Oar Reefs, with the reverse. A reef extends from Abbey Point to the S.W., and also to the northward. When off Abbey Point, Kumi Head, a rocky headland, will be seen about 1½ miles North of the town; and upon the ridge of high land beyond it are three hummocks to the left of a cluster of trees. In the distance, a little to the left of these, is *Mount Onnodake*, in lat. 26° 27' N. A remarkable rock, which from its form has been named *Capstan Head*, will next appear; and then to the northward of the town a rocky head, with a house upon its summit, called *False Capstan Head*. At the back of Capstan Head is *Sheudi Hill*, upon which the upper town, the capital of Lu-chu, is built.

An abundance of water can always be obtained at the fountains in Junk River, where there is excellent landing for boats. There is a good spring near the tombs at Kumi Bluff; but unless the water is quite smooth, the landing-place is impracticable.

A black spar buoy is moored on Blossom Reef halfway between its eastern and western extreme; a red spar buoy on the point of reef W.N.W. of Abbey Point; and a white spar buoy on the S.E. extreme of Oar Reef. Flags of corresponding colours are attached to all these buoys, and they afford good guides for the South and Oar Channels. There are two large stakes on the reefs eastward and westward of the North channel, planted there by the natives, this being the channel mostly used by junks trading to the northward. The spar buoys may be displaced, or entirely removed by the heave of the sea, and should therefore not be relied on.

It is high water, full and change, in Napha-kiang Road, at 6^h 30^m, and the rise is from 5 to 7½ ft.; but this was very irregular during the *Blossom's* stay at this anchorage.

As may be readily understood, it is difficult to give intelligible directions for this complicated harbour without the chart.

There are three passages leading into Napha-kiang Road, named the *North*, the *Oar*, and the *South Channel*. To sail by the South Channel, between Blossom and Abbey Reefs, having well opened Capstan Head, haul towards Abbey Reef, and bring the right-hand hummock about half a point eastward of Kumi Head; this mark will lead through the South Channel, in about 7 fathoms, over the tail of Blossom Reef. A vessel may now round Abbey Reef tolerably close, and steer for the anchorage in 7 fathoms, about half a mile N.N.W. of False Capstan Head. Care must be taken to avoid the *Ingersoll Patches*, on which there is only a fathom water. Should the wind veer to the eastward in the South Channel, with the above mark on, do not stand to the northward, unless the outer cluster of trees near the extremity of Wood Hill is in line with, or open westward of Table Hill, a square rocky headland to the southward of it. This mark clears also the tongue of Oar Reef.

The best anchorage is in Barnpool, at the N.E. part of the road, in 7 fathoms, where a vessel may ride with great security. The outer anchorage would be dangerous with strong westerly gales.

The following directions for the South Channel are by Lieutenant S. Bent, of the U.S. Japan American Expedition, 1853. He found two patches of only $2\frac{1}{2}$ and $1\frac{1}{2}$ fathoms water; the former named *Lexington Reef*, lying W. $\frac{1}{2}$ S., $1\frac{1}{2}$ mile from Abbey Point; and the latter of $1\frac{1}{2}$ fathom, W.S.W. $1\frac{1}{2}$ mile from the point:—

The clearest approach to Napha-kiang Road from the westward is by passing northward of the Kerama Islands and sighting Agenhu Island, which will be recognized by its wedge-shaped appearance; from thence steer a S.E. course for the road, passing on either side of the Reef Islands; being careful, however, not to approach them too near on the western and southern sides, as the reefs below water in these directions are said to be more extensive than is shown on the chart.

After clearing the Reef Islands, steer for Wood Hill on a S.S.E. bearing until getting upon the line of bearing for the South Channel. This will lead well clear of Blossom Reef, yet not so far off but that the white tomb and clump of trees or bushes southward of Kumi Head can be easily distinguished. An E. by N. $\frac{1}{2}$ N. course now until Abbey Point is in one with outer trees will clear S.W. rock, when haul up for Kumi Head, and select a berth about half a mile northward and westward of False Capstan Head. This channel, being quite straight, is better for a stranger entering the harbour than the Oar Channel, which, though wider, has the disadvantage of its being necessary for a vessel to alter course some four or five points, just when she is in the midst of reefs which are nearly all covered.

If the wind be to the north-eastward it will be advisable to beat through the *Oar Channel*, in preference to the South Channel.

A good mark to run through this channel is to bring the centre of the
North Pacific.

island in Junk Harbour (known by the deep verdure of its vegetation) to fill the gap between the forts at the entrance of that harbour, and steer a S.E. $\frac{1}{4}$ E. course, until Capstan Head bears East, when haul up E.N.E., and anchor as before directed.

The *North Channel* is much contracted by a range of detached rocks extending from the reef on the West side, and should not, under ordinary circumstances, be attempted by a stranger, as at high water the reefs are almost entirely covered.

Sailing from Napha during the N.E. monsoon, it will be better to pass round the South end of Great Lu-chu, in order to avoid beating through the Montgomery group, of which there is no reliable survey; they are said to consist of five islands, surrounded by reefs. But with a southerly wind and fine weather it will be to the advantage of a vessel bound to the Bonin Islands to pass round the North end of Great Lu-chu, where she will feel the influence of the current, which will assist her to the eastward.

Deep Bay—at the head of which is the observatory spot of the U.S. ship *Vandalia*, 1854, in lat. 26° 35' 35" N., long. 127° 59' 42" E.—is formed on the western side of Great Lu-chu, and although open to the West and S.W. affords good anchorage off the town of *Naguh*, about half a mile from its head; for winds from these quarters rarely blow home, and if they do they never raise a sea, as the latter is broken by the great depth of the bay.

Suco or *Setsi Island*, lying about a quarter of a mile from the N.W. coast of Great Lu-chu, to the northward of Deep Bay, has excellent anchorage between its eastern side and the coast, protected from all winds, and wood, water, and fresh provisions can be easily procured.

Port Onting, or *Melville*, is on the N.W. part of Great Lu-chu, and its entrance is between the eastern side of *Kui* or *Herbert Island* and the western side of the reef fronting the peninsula, and which projects 5 or 6 miles to the westward, having a small islet near its extremity. Iye sima or Sugar-leaf island, lying about 12 miles westward of the entrance, is a good guide for it, the island being low and flat, with the exception of a sharp conical peak rising 561 feet above the sea, at its eastern end. Good water can be obtained at the village of Onting. In Port Onting it is high water, full and change, at 6^h 35^m, and the rise is about 8 feet.

In entering, steer for the western shore of *Kui* Island until Hele Rock is in line with Double-topped mountain (a distant double-topped hill, the second highest of the range), bearing S.E. $\frac{1}{4}$ S. Steer in on this mark, until Chimney Rock bears S. $\frac{1}{4}$ E.; then for Chimney Rock until Rankin point bears S.W. $\frac{1}{4}$ W.; then for that point until the port is entered, when anchor, giving the vessel room to swing clear of the reef extending northward of Rankin point, and she will be as snug as if lying in dock, with good holding ground, completely land-locked, and sheltered almost entirely from every wind.

Shah Bay, about 8 miles E.S.E. of Port Onting, is a beautiful land-locked sheet of water, but the reef fronting the entrance prevents its being accessible to vessels of larger size than the junks which frequent it; within the entrance the water deepens to 12 and 8 fathoms, the bottom being soft mud. On the southern shore of the bay was found iron ore, mineral coal, and sulphur. The coal appeared of poor quality and mixed with earth, but good coal might perhaps be found by digging.

Barrow Bay is a deep inlet, bounded by shoals, near the middle of the eastern coast of Great Lu-chu. The following description is by Lieutenant G. B. Balch, of the U.S. ship *Plymouth*, 1854.

A reef, of coral formation and bold to approach, commences 5 miles from the South point of Great Lu-chu, and extends in an unbroken chain, outside all the small islands, as far as the N.E. point of Ichey Island, with the exception of a narrow channel between the islet off the N.E. end of Kyoko or Kudaka Island, and the island of Taking. Ichey Island forms the south-eastern point of Barrow Bay, which is useless for all purposes of navigation, being exposed to the East winds and ocean swell. There is, however, secure anchorage in about 15 fathoms water on the western sides of Ichey, and of Hanadi, the next islet to the southward; this anchorage is the only place of shelter on the eastern coast of Great Lu-chu.

MEIACO-SIMA ISLANDS.

This group forms the westernmost portion of a chain of islands extending in an easterly and north-easterly direction from Formosa to the southern extremity of Japan, and is divided into two divisions, Pa-chung-san and Tai-pin-san. The Pa-chung-san or western division, consists of ten distinct islands, of which five only are at all mountainous; the remainder are flat, like the coral islands in the Pacific, and similarly belted with reefs, which connect them into a distinct group. Besides these there is Chung-chi Island, a high uninhabited mass of rocks; and to the W.N.W. of it Kumi Island, conspicuous by the peculiar sharpness of its lofty peak, 770 ft. high, and table base.

KUMI ISLAND is composed of coralline limestone, all its ranges are capped with trees and brushwood, but excepting the pine fir, which contains a great portion of resin, none attain any size. There are four villages on the island, one on the West, and two on the North side, one of which is inland, in a basin-shaped valley. The principal town and port is on the North side. Temporary anchorage, in fine weather, may be found on a sandy ledge northward of the town.

A *dangerous shoal*, 3 miles in extent, East by North and West by South, is reported as lying N.W. by W., distant about 10 miles from Kumi.

Breakers have also been seen apparently on a dangerous shoal, extending East by South and West by North, and bearing from Kumi, S.W. by W. $3\frac{1}{2}$ leagues distant.

KU-KIEN-SAN and **PA-CHUNG-SAN ISLANDS** afford several commodious harbours, and are, with good charts, quite safe of approach. Port Haddington, on the West side of the latter island, would shelter a large fleet, but it abounds with coral patches, rising suddenly from 10 or 15 fathoms almost to the surface; in clear weather all those having as little as 5 fathoms are clearly discernible, and therefore easily avoided. Except on the northern side of Ku-kien-san and the latter port, watering would be found very difficult, as reefs extend a great distance from the mouths of the streams. *Seymour Bay*, at the S.W. angle of Ku-kien-san, must also be excepted, for there a fine stream enters the sea in deep water, and a vessel might be moored sufficiently close to lead the hoses from Hearle's pumps into her, without the intervention of boats and casks.

With respect to the various harbours of Ku-kien-san, there are two or three adapted for shelter for small vessels, or even those drawing 18 feet, where a refit might be accomplished in still water in any monsoon, or where steam vessels might lie safely for the purpose of obtaining wood; and there are two other open bays, well sheltered in the N.E. monsoon, admirably adapted for watering; but there is not any other inducement to visit this island. All the dangers are well marked by the coral fringe which extends about a cable's length from the outline.

Of the dangers on the northern side of this group, it would not be prudent that any vessel should run the risk of being hampered by the shoals, and therefore should not come farther eastward, when beating up for Chusan, than to sight Chung chi Island. The currents as these islands are approached press more southerly and easterly than those that are experienced on the coast of Formosa, and stronger breezes prevail as a vessel advances easterly. Indeed it blows incessantly at this western group.

The islands composing the **Tai-pin-san** (or **Ty-ping-san**) or eastern division, are **Tai-pin-san**, **Yer-ra-bu**, **Ku-ri-mah**, **Coruma**, and **Hummock Island**. The two islets, **Mitsuna** and **Tarara**, between **Tai-pin-san** and **Pa-chung-san**, are said to be a continuation of the reefs which extend to the N.E., N., and N.W. of **Tai-pin-san**, and on which H.M.S. *Providence* was lost in 1797. Captain (Sir Edward) Belcher looked in vain for **Ykima Island**.

TAI-PIN-SAN ISLAND is surrounded by an extensive chain of coral reefs, upon which the islands of *Ku-ri-mah*, *Yer-ra-bu*, *Coruma*, and *Hummock* respectively are situated to the West, N.W., North, and N.E. The reefs do not project far westward from **Ku-ri-mah**, unless in patches unconnected with the main belt. Off **Yer-ra-bu** they extend 3 or 4 miles, but close towards its north-western angle, where a deep water channel admits vessels within the belt up to **Hummock Island** and into the main har-

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bour of Tai-pin-san. The reefs again spit out on the S.W. angle of Coru-mah, and sweep northerly, as far as the eye can reach (from 100 feet elevation), round to East in continuous lines of breakers, edging in towards the south-east extremity of Hummock. A high patch of rocks lies on the N.E. angle of this outer belt, probably 10 miles from the northern point of Tai-pin-san.

Safe anchorage during the S.W. monsoon might be found inside the reefs of Hummock Island, and also safe in the other monsoon; but the passage in or out at that season would be attended with risk, as sudden squalls, gales, and numerous patches beset the whole eastern side of Tai-pin-san. The southern coast line, from the south-east breaker patch to the south-west anchorage, does not offer many dangers if a tolerable look-out be observed. The reefs do not extend more than half a cable from the shore, and generally less.

There can be no inducements for any vessel to visit Tai-pin-san; neither wood, water, nor any other necessities could be procured.

Capt. (Sir Edward) Belcher, H.M.S. *Samarang*, December 1844, says:—Great caution is requisite in approaching the Meiacosima group from the N.E., East, or South, particularly with fresh breezes, and in the absence of the sun, by the aid of which reefs below water can be detected. They are, from their greenish hue, being covered by seaweed, less distinct than at other places, and therefore, where they are not marked on the chart, it must not be presumed that the space is free from danger; the lead will not afford timely warning.

Approaching the group from the S.W., the island of Ku-kien-san from its great height will be first distinguished, presenting a round-backed summit closely clad with trees; knolls occur, elevated 2,000 ft. above the sea, but as they seldom present the same appearance, owing to those nearer the coast eclipsing them, their accurate measurement could not be obtained; Adam Peak, which may be noticed on the south-eastern outline, was determined to be 1,200 ft. As the island is neared, the high rocky basaltic island of Chung-chi will show out when the western limit of Ku-kien-san bears N.E. by N., and working for this islet no danger can be feared, and should night befall, all the space on the north-west of Ku-kien-san up to the island of Kumi is safe.

The *Samarang* entered the group from the westward, passing within two miles of the southern reefs or breakers off Hasyokan or Sandy Island, and standing on close hauled to the eastward, intending to make Ykima, and beat up from it to Tai-pin-san. On the morning following, not seeing Ykima (which is supposed not to exist), and the weather very boisterous, she stood on to the westward to get under the lee of Pa-chung-san, and endeavour to reach some place of shelter. On nearing the latter island she ran down the

eastern and southern side, reaching the south-western extremity of its reef about 4 p.m.

Here was a barrier of breakers as far as the eye could reach from the mast-head, and apparently connecting Hasyokan Island with the group of larger islands. An opening, however, was found into the reef, and after due examination the vessel was shot up into 13 fathoms, into Broughton Bay, and warped into a snug position, where she was moored with just sufficient room to swing, the depths up to the coral ledges varying from 13 to 7 fathoms.

Broughton Bay.—The only directions which will assist the seaman in finding this snug little anchorage (safe only, however, during the N.E. monsoon) are as follows:—

Approaching from the westward, as Chungchi is neared, Hasyokan or Sandy Island will soon be seen, and avoiding the space included northerly of a line between Chungchi and it, a vessel may safely stand on, passing within one mile of the southern limit of Hasyokan, and work for the S.W. angle of Pa-chung-san, avoiding the reefs, which extend from it in a direct line N.E. and S.W. to Hasyokan. A high rock, named South Rock, will point out the outer reefs of Pa-chung-san. The dangers between it and Pa-chung-san must be avoided by eye, the shoals being visible in 5 or 6 fathoms, and breaking upon those of 2 and 3 fathoms. The opening of the reef is in the heart of a deep indentation, just northward of the low S.W. point of the island, and it has apparently a centre bar. The right-hand opening is the proper one.

From the eastward there are no dangers which are not clearly visible. After making the land edge along the southern and eastern breakers until the abrupt turn of the breaker line is seen, at which moment the extreme S.W. point of the bay will open. The breakers have regular soundings off them, but the course in will probably lead in 7, 8, or 9 fathoms, deepening to 14 or 15 off the inlet. As the breeze generally blows out, it will be advisable to send a boat to find clear ground off the opening, and shoot up and anchor. The vessel may then be warped in. But if merely intending a cursory visit, the outer anchorage appears good.

At Broughton Bay, neither wood nor water can conveniently be procured; and the only reason for noticing it is, that a port of refuge with still water, in case of disaster, may be found on this side of the island; when a disabled vessel could not beat round to the more secure harbour of Port Haddington.

There is a passage from Port Haddington into Broughton Bay, which was used by H.M.S. *Lily* and *Contest*, in 1852, but it abounds with coral reefs.—*Commander J. W. Spencer, H.M. sloop Contest.*

Port Haddington.—No safe anchorage is to be met with between Broughton Bay and Port Haddington, which is on the West side of Pa-chung-san;

although during the S.W. monsoon there are several good bays on the northern side of the island, where anchorage might be found, but certainly not adapted for refit.

When rounding the north-eastern extremity of Pa-chung-san the two low coral islets of Mitsuna and Tarara ought to be avoided at night, but the dangers by day are clearly denoted by breakers. To the northward of these islets the ground is foul, and the *Samarang* was compelled to tack to the westward in 7 fathoms, at least 10 miles North of them.

Proceeding from Broughton Bay to Port Haddington, after rounding the N.E. end of the Pa-chung-san breakers, and running to the westward the length of the island, haul close round the N.W. angle, and edge along southerly within about a mile of the breakers. The port will then open out, into which, with the prevailing breeze of the N.E. monsoon, it will be necessary to beat. Off Hamilton Point, the North point of the port, will be seen a remarkable little rocky hummock upon which was left a large pile of stones. The bottom, for more than a mile off the point, is rocky and dangerous; but as all the dangers off this port are visible from aloft, there is no risk with a proper look-out. There is abundance of excellent anchorage without, and where the vessel will be land-locked. The *Samarang* anchored about a mile or less within Hamilton Point, in 10 fathoms, clear bottom.

This is a most convenient port during the N.E. monsoon. It is land-locked, it is true, but there is a long fetch for the sea with a south-west gale, and in that season typhoons are said to be very violent about this region.

A convenient watering-place was established by sinking a cask and suspending the suction hose of Hearle's pump over it, so as to prevent the sand from being sucked in. Here wood is abundant, and the position is farther preferable by being so far from the villages as to prevent the authorities from feeling alarmed.

Sir Edward Belcher strongly suspects that extensive banks or ledges of coral connect these islets (northerly) with Tai-pin-san; and a good reason for this offers in the fact of their being included by the natives in the Tai-pin-san group, when they are much closer, by half the distance, to Pa-chung-san.

The observatory at the S.W. angle of Tai-pin-san (at the most convenient landing-place within the reefs, and the last rocky point towards the long sandy bay) is in lat. $24^{\circ} 43' 35''$ N., long. $125^{\circ} 17' 49''$ E.

To the north-westward of the Meisaco-sima group, and north-eastward of Formosa, are several islets and rocks, apparently volcanic, which have been only properly known of late years, and even to the present time their correct number and positions are not absolutely determined. The principal are those to the westward, Hoa-pin-su and Pinnacle, and the Ti-a-usu Islands

which are about 15 miles apart, in a N.E. and S.W. direction. Within this space are several reefs, and although a safe channel exists between Hoa-pin-su and the Pinnacle Islands, which are two miles apart, it ought not (on account of the strength of the tides destroying the steerage) to be attempted by sailing vessels if it can be avoided.

HOA-PIN-SU is the south-westernmost, and is about 95 miles E.N.E. from Kelung Harbour, at the North end of Formosa. The extreme height of Hoa-pin-su is 1,181 ft., the island apparently being cut away vertically at this elevation, on the southern side, in a W.N.W. direction; the remaining portion sloping to the eastward, where the inclination furnished copious rills of excellent water. The North face of the island is in lat. 25° 47' 7" N., long. 123° 30½' E. There are no traces of inhabitants, indeed the soil is insufficient for the maintenance of half a dozen persons.

The **Pinnacle Group**, which is connected by a reef and bank of soundings with Hoa-pin-su, allowing a channel of about 12 fathoms water between it and the *Channel Rock*, presents the appearance of an upheaved and subsequently ruptured mass of compact gray columnar basalt, rising suddenly into needle-shaped pinnacles, which are apparently ready for disintegration by the first disturbing cause, either gales of wind or earthquake. On the summits of some of the flat rocks long grass was found, but no shrubs or trees. The rocks were everywhere whitened by the dung of marine birds.

Ti-a-usu, bearing N.E. northerly 15 miles from Hoa-pin-su appears to be composed of huge boulders of a greenish porphyritic stone. The capping of this island, from about 60 feet to its summit, which is about 600 feet above the sea level, is covered with a loose brushwood, but no trees of any size.

RALEIGH ROCK.—The existence of this rock was considered doubtful before July, 1837, when it was seen by H.M.S. *Raleigh*, bearing S. ¼ W., distant 12 or 14 miles. Its position by her reckoning was about latitude 25° 57' N., long. 124° 2' E., but later authorities place it 9' farther eastward. It rises abruptly from a reef to a height of 90 ft. above the sea, is perpendicular on all sides, covers an area of probably 60 ft. in diameter, and appears in the distance as a junk under sail. Sir Edward Belcher states that the weather would not allow him to fix its position, but that as he found it lying upon the computed bearing, as given in the charts, from Ti-a-usu, its position cannot be much, if at all, in error.

RECRUIT ISLAND.—At about 30 miles eastward of the Raleigh Rock, another lofty island was apparently first seen on March 11, 1861, by Captain J. Lyall, in the *Recruit*. It appeared, at a distance of 10 miles, to be 600 ft. in height, the same size and height as Ti-a-usu.

It was again seen in 1863 and 1864 by Captain R. Tatchell, in the brig *Speedy*, and he says that when it bears West at 4 leagues distance, it has the appearance of two rocks. Captain Crowdace, in the ship *King Lear*, describes it as only 90 feet high, rising very abrupt; and when bearing West, northerly, a small rock standing erect, like a pillar in ruins, was seen detached from the North side.

The four observations for its position coincide very nearly, and give a mean of lat. $25^{\circ} 57' 40''$ N., long. $124^{\circ} 43'$ E.

This will conclude our descriptions of the islands of the North Pacific Ocean. The reader has been brought around its shores from Equatorial America along the sea boards of its American and Asiatic boundaries, past countries of most widely opposite characteristics and interest. The islands which lie between these coasts have also been enumerated and described, and in these varied subjects we feel how great has been the increase in our knowledge and in their importance in the interval of 20 years, since the first edition of this book was issued.

The continuation of its western limits is included in the companion volume, the *Directory for the Indian Archipelago, China, and Japan*. The various archipelagoes, the Philippine Islands, and the eastern groups of that great insular world which bound the Pacific to the westward, are there fully described.

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SECTION IV.

THE PHENOMENA OF, AND DIRECTIONS FOR THE NORTH PACIFIC OCEAN.

THE preceding pages having been devoted to directions, more or less extended, of the features of the coasts and islands of the North Pacific, and including, incidentally, many notices of the peculiarities of the climate, and meteorology of each region, there remains to be given a general view of the meteorology of the ocean in a broader sense. But in a few words it may be said that the arrangement of the phenomena in the North Pacific is so simple and these are so easily applied to the service of navigation, that the ensuing remarks need not be enlarged upon, further than is needful to give a connected view of the subject.

What follows will be a brief account of the N.E. trades and the Anti-trade winds as experienced in the open ocean, and then a few remarks additional to what have been before given on the various sections of the coast. To these will be added an account of its currents, tides, and magnetism, and the concluding chapter will be devoted to the application of the phenomena to the best mode of making successful passages between the various ports.

V.

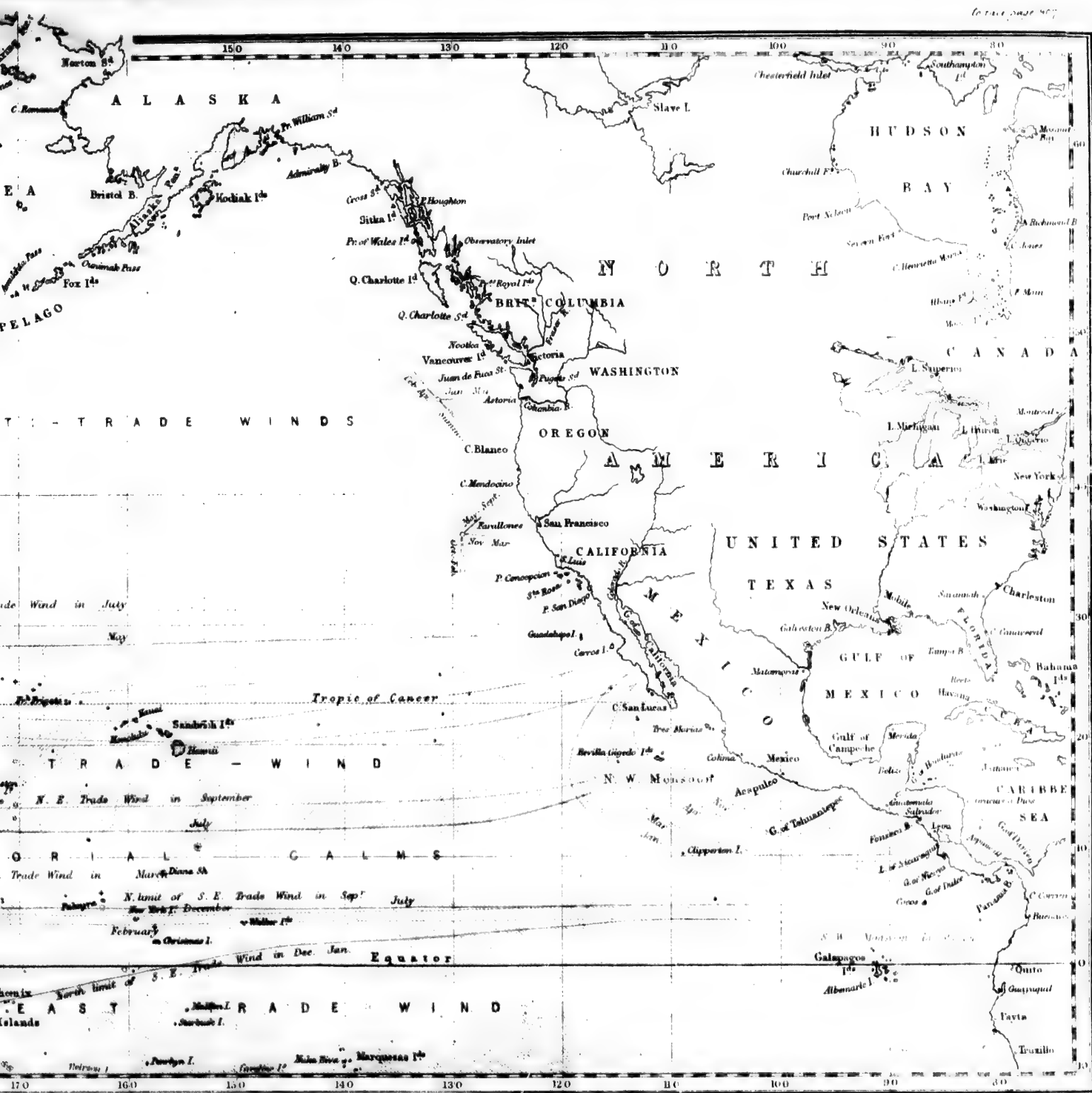
INSTRUCTIONS FOR THE OCEAN.

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CHAPTER XIV.

1. THE WINDS OF THE NORTH PACIFIC OCEAN.

THERE is a general analogy between the meteorology of each of the great oceans, especially of the Atlantic and Pacific. This has been dilated on in each of the series of Directories, of which this forms a part, and therefore does not require much discussion here. In our North Atlantic Memoir especially, Section III, pp. 177—216, the arrangement of the wind-zones and the causes which lead to this arrangement are fully described. In the volume on the Indian Ocean, Chapter I, pp. 1—76, the peculiarities of that ocean are shown, differing as it does from the other great water areas in having the great continent of Asia at its northern boundary, on the division between the wind and current systems of the Northern and Southern Hemispheres. To this physical peculiarity the phenomena of the changing monsoons is owing.

The North Pacific more resembles the North Atlantic than the other oceans in its meteorology, but differing from that ocean in not having any connexion with the Arctic area, for the passage of Behring Strait is too shallow and too narrow to affect the general question. Further than this, the great area of the Pacific seems to exercise a deadening effect on the motive forces of the atmospheric and ocean currents which pass over it, both being of a more moderate character than in the Atlantic.

There are very considerable variations from the normal condition of the winds when near the land, where the effect of heat and season so greatly modify the aerial currents as to produce real monsoons on either side of the ocean. Many of these exceptional cases have been noticed in the preceding pages; others will be alluded to presently.

The general anemological arrangement of the North Pacific is thus:—To the northward of about lat. 30° (a parallel varying with the season) are found the S.W. anti-trade winds; between that parallel and lat. 7° or 10° N. (also varying with the sun's declination) is found the N.E. trade wind, and

between the last-named parallel and the northern point of the S.E. trade wind is a narrow belt of calms or variable winds, to which the name of "*Doldrums*" has been applied; it is a well-known belt of difficulty to the sailor.

Captain Maury says: "It has a mean average breadth (around the globe) of about six degrees of latitude. In this region the air which is brought to the Equator by the N.E. and S.E. traders ascends. This belt of calms always separates these two trade wind zones, and travels up and down with them. If we liken this belt of equatorial calms to an immense atmospherical trough, extending as it does entirely round the earth; and if we liken the N.E. and S.E. trade winds to two streams discharging themselves into it, we shall see that we have two currents perpetually running in at the bottom, and that, therefore, we must have as much air as the two currents bring in at the bottom to flow out of the top. What flows out of the top is carried back North and South by these upper currents, which are thus proved to exist and to flow counter to the trade winds."

The belt of calms follows the sun in his annual course, though the limits do not range so much in latitude as the sun does in declination, and generally they pass from one extreme of latitude to the other in about three months. The whole system of wind and calm belts move northward from the latter part of May till some time in August; they then remain almost stationary till the approach of winter, when they commence to go southward, and proceed in that direction from December till February or March.

Owing to the unequal distribution of land and water in the two hemispheres, the relative proportions being in the northern hemisphere 100 land to 150 water; and in the southern 100 land to 628 water; and, owing to the great influence that the presence of land has on the aerial currents, the division of the two wind systems is always to the North of the Equator, that is, the mathematical and meteorological equators do not coincide.

The extent of the trade winds in latitude is usually considered to be from 30° S. to 30° N., but these limits are subject to so many variations, that such a statement must be received with great limitations. We have not the means of drawing such a close approximation to a true mean as can be done in the Atlantic Ocean, from the fewer recorded observations, but the following table is given by the late excellent Ch. Ph. de Kerhallet, of the French Marine, as the result of 92 vessels which have crossed the line between the longitudes of 106° and 147° West.

Table of the limits of the N.E. and S.E. Trades, and the breadth of the interval between them in each month.

	TRADE WINDS.								Breadth of the intervening zone of calms, &c.	
	Polar Limit.				Equatorial Limit.					
	Of the N.E.		Of the S.E.		Of the N.E.		Of the S.E.			
	Lat. N.	Lat. S.	Lat. N.	Lat. N.E.	Lat. N.	Lat. N.E.	Lat. N.	Lat. N.E.		
	°	'	°	'	°	'	°	'	°	'
January	21	0	33	25	6	30	3	0	3	30
February	26	28	28	51	4	1	2	0	2	1
March	29	0	31	10	8	15	5	50	5	25
April	30	0	27	25	4	45	2	0	2	45
May	29	5	28	24	7	52	3	36	4	16
June	27	41	25	0	9	58	2	30	7	28
July	31	43	25	28	12	5	5	4	7	1
August	29	30	24	18	15	0	2	30	12	30
September	24	20	24	51	13	56	8	11	5	45
October	26	6	23	27	12	20	3	32	8	48
November.....	25	0	28	39	..	..	..	..	..	..
December	24	0	22	30	5	12	1	56	3	16

It will be seen according to this table, that the polar and equatorial limits of these trade winds vary with the season, and remove further from or nearer to the Equator, according as the sun has North or South declination; and that the breadth of the intervening zones is less in winter than in the summer of the northern hemisphere. In other respects this zone has much resemblance to the corresponding belt in the Atlantic. It is in reality broader on the meridians of 90° to 110° than further to the westward, those of 120° to 150° W. longitude; that is to say, the breadth of the calm zone diminishes according as you advance westward, precisely analogous to the wind system in the Atlantic, the recent knowledge of which has had such a marked influence on the trans-equatorial voyages.

The term calm-belt is not precisely applicable to these equatorial "doldrums," because, besides calms and light airs, variable between N.W. to South by the West, storms, gales, and abundant rain are frequently encountered.

Owing to the land influences before alluded to, the northern limit of this zone is at the mean in lat. 8° N., and its mean southern edge is on 3° N.

But it sometimes occurs that the two trade winds meet each other without any intervening space of variables or calms.

The *North-east Trade Wind* needs but few remarks. Beyond the space on the eastern part of the ocean, where land influences modify or reverse its usual character, it is found to blow with steady but moderate force over the whole of the eastern part of the ocean. Towards its western part, that is, beyond and about the Marianas, it is less certain, and here the vanishing effect of the S.W. and N.W. monsoons are sometimes felt. But in this part of the ocean our knowledge is somewhat deficient, a subject of less regret, seeing that it is comparatively but little traversed. The illustrative diagram will afford the best insight into its area and limits in the various seasons. On its northern edge lies the Hawaiian group, which in alternate seasons is within its effects, or in the belt of tropical variables.

The *S.W. Anti-trade or Passage Winds*, which occupy all the northern part of the ocean, will require still fewer words. It has all the general characteristics of the similar wind in the Atlantic, and perhaps is more persistent on the western side of the ocean. But here it is very much affected by the vast area of land it passes over, and reaching the ocean as a very dry and cold wind, it has a correspondingly severe effect on the climates of the northern parts of Japan, Saghalin, the Sea of Okhotsk, &c., which are proverbially inclement, and for a long period of the year completely ice-bound. On reaching the open ocean, where the great return stream, called the Japanese Current, runs to the north-westward, carrying with it the warmer water of the tropical latitudes, this cold and dry wind so condenses the warmer vapours which hang over the current, that they are condensed into almost perpetual fogs. A similar and well-known region is found in the vicinity of the Banks of Newfoundland, but here these fogs extend far to the westward, and envelope more or less continually the extensive ranges of the Kurile and Aleutian Islands.

Dissolving these vapours and acquiring further humidity, and also increased temperature, in its further progress to the eastward and north-eastward, it is found on the Alaska coasts as a warm, rain-bearing wind, which deposits its abundant moisture on the coasts and islands of that hitherto unfrequented region, recently ceded to the United States by Russia.

Further to the southward, the territories of British Columbia, the climate, as is well known, is not subject to extremes of heat and cold on the coast regions, but within the range of mountains, which intercept much of this anti-trade wind, and consequently of its warmer moisture, the climate is much more severe. Of California, one of the finest countries in the world, and possessing every advantage of mild temperature and sufficient moisture, we have spoken elsewhere. A few words will follow.

As before said, the action of the land on these different aerial currents is very great, and can only be understood by a special description of each district. The following selection is given to afford this insight.

CENTRAL AMERICA.—On pages 4 and 5 are given some general remarks on the climate of the western coast of the great American peninsula. The following is by the late Lieut.-Comm. Jas. Wood, R.N., who surveyed portions of the coast in H.M.S. *Pandora*. The first part of these observations refers to the coast to the southward of Panama, but will be useful to sailing vessels making this difficult port.

GUAYAQUIL RIVER TO GUASCAMES POINT.

The Intertropical.—Along the whole of the coast from the River Guayaquil, in 3° S., to Guascames Point, in 2° N., the wind is mostly from South to West all the year round; the exceptions are few, and generally occur in the fine season. Both in beating up this coast to the southward, and in running down it, the former in the months of May and June, the latter in those of October, November, and January, we had the wind from S.S.E. to West (by the South), with a constant current to the north-eastward, the only difference being that the winds were lighter, and the weather finer in May and June as we got to the southward; whilst the contrary took place in October and November; and in January the weather was generally fine with moderate breezes.

CHOCÓ BAY.—After entering the Bay of Chocó, of which point Guascames forms the southern horn, the winds become more variable; but during the time we were in the bay (from the end of January to the middle of March) it never blew very fresh, though the weather was often unsettled, and heavy rains frequent. The prevailing wind was from S.W., but north-westerly winds were not uncommon.

CHIRAMBIRA POINT TO THE GULF OF SAN MIGUEL.—When past Chirambira Point (the northern horn of Chocó Bay) we had the wind more from the northward, and in the latter end of March had to beat up to Panama Bay against north-westerly and north-easterly breezes, blowing a fresh breeze at times, especially as we approached the bay.

In surveying this last-named part in January, 1848, we found the winds more variable, heavy rains almost always accompanying a change to S.W., from which quarter we once or twice had a stiff breeze.

GULF OF SAN MIGUEL TO THE GULF OF DULCE, INCLUDING THE BAY OF PANAMA'.

First, or Intertropical Winds.—Between the southern point of the Gulf of San Miguel and the Gulf of Dulce, including Panamá Bay and the coast of

Veragua, the winds are regulated by the seasons. Towards the end of December the northers begin to blow. These are fine, dry breezes, which generally come on in the afternoon, and blow very fresh from N.N.E. to N.N.W till near midnight, with a perfectly clear and cloudless sky, and the air so dry and rarified that objects on a level with the horizon are distorted and flattened, and the same effects are caused as are seen during an easterly breeze off our own coast. Though generally a double-reefed topsail breeze, they occasionally blow much harder, especially off the coast of Veragua, where, in the months of January and February, even a close-reefed topsail breeze is not uncommon. During even the strongest of these, a dead calm often prevails 10 or 15 miles off the land, the only evidence of the gale that is blowing within a few hundred yards of you being the agitation of the water, which is raised into short hollow waves, which break on board and tumble you about awfully.

Towards the end of March up to the middle of April, the northers begin to cease, and are succeeded by calms and light sea and land-breezes, with occasional squalls from the south-westward. As April advances the squalls get stronger and more frequent, and by the early part of May the rainy season generally sets in, during the greater part of which South and south-westerly winds prevail. These are not very violent within the Bay of Panamá; but from Punta Mala westward, gales from the above quarters are frequent, and sometimes severe, bringing a very heavy sea with them.

GULF OF DULCE TO THE GULF OF FONSECA.

From the Gulf of Dulce, proceeding westward along the shores of Costa Rica, Guatemala, and Mexico, we find the winds still follow the changes of the seasons, modified, however, by locality. For instance, whenever the northers prevail, we find them blowing off the shore at nearly right angles to the run of the coast; thus, as soon as the coast of Nicaragua is approached (which takes a more northerly direction than that before mentioned) we find during the fine season the northers exchanged for breezes called Papagayos. These blow from N.N.E. to E.N.E. or East, and are accompanied by the same clear fine weather as the northers; the prevailing wind, however, during this season (from January to April) is from S.E. to N.E. From May to November, which is the rainy season, the weather is mostly bad, gales from the West and S.W., with thunder, lightning, &c., being frequent, and at times violent.

GULF OF FONSECA TO THE GULF OF TEHUANTEPEC.

After passing the Gulf of Fonseca, where the land again trends nearly due West, the northerly winds are lost, till on reaching the Gulf of Tehuantepec we meet them once more, but under a different name, and assuming

a more violent character. Along this portion where the mountains approach, and even in some places form the coast line, the winds during the fine season are the usual tropical land and sea-breezes; the former from N.W., the latter from South to W.S.W. and West. The remaining months are marked by even worse weather from the same quarters as is found on the Nicaragua coast.

FROM THE GULF OF TEHUANTEPEC TO TEXUPAN POINT.

First, or Intertropical Winds.—The heavy blasts which blow over the isthmus of Tehuantepec derive their source from the country they cross. They seem to be caused by the northerly winds in the Gulf of Mexico, which here find a vent through the opening formed between the Mexican and Guatemalan mountains. They blow with great force from North to N.N.E., and raise a very high short sea; their force is felt for several hundred miles off the coast. During the season when they prevail (December to April) every preparation should be made to meet and carry sail through them; if this can be done they are soon crossed, and 200 to 250 miles of westing (or easting) made; otherwise, if you are obliged to heave-to, 36 to 118 hours of heavy weather may be expected, exposed all the while to a very high and short sea. In the rainy season these cease; but the weather here, as along the whole coast of Mexico, is then very bad, gales and strong breezes from S.E. to S.W. constantly occur, whilst squalls, accompanied by thunder and lightning, with heavy and almost incessant rain, characterize the season throughout. These gales are at times very severe, rendering the navigation of such a coast very unpleasant, as, with one exception, there is scarcely any shelter from them to be found. During the fine season, however, nothing can be more regular or quiet than the weather on the Mexican coast. A regular sea-breeze sets in about noon, beginning from S.S.W. to W.S.W., and getting more westerly as the sun goes down, decreasing with it, and gradually sinking into a calm as the night closes in. This is succeeded by the land-wind off the shore, which is more irregular in its direction and force; but these winds, and the method of making a passage to the westward along the coast, have been so well and so truly described by Dampier and Basil Hall, that nothing remains but to add my testimony to the correctness of the accounts they give as far as their phenomena fell under my own observation.

As soon as the coast begins to trend northerly again, which it does about Texupan Point, we meet the northerly winds which blow down the Gulf of California, and which are found pretty steady during the fine season a few miles off the coast; by taking advantage of these, and the daily variations caused by the land and sea breezes, the passage is made from this point to San Blas and Mazatlan; but it is always a tedious beat, owing to a contrary current and frequent calms.

North Pacific.

WEST COAST OF MEXICO.

On pages 86 to 82 some remarks will be found from the pen of Commodore C. B. Hamilton, 1849, describing the winds and weather experienced on board H.M.S. *Frolic*. To these may be added here some observations taken from Captain Basil Hall's well-known work.

On the S.W. coast of Mexico, the fair season, or what is called the summer, though the latitude be North, is from December to May inclusive. During this interval alone it is advisable to navigate the coast; for, in the winter, from June to November inclusive, every part of it is liable to hard gales, tornadoes, or heavy squalls, to calms, to constant deluges of rain, and the most dangerous lightning; added to which, almost all parts of the coast are at this time so unhealthy as to be abandoned by the inhabitants. At the eastern end of this range of coast, about Panama, the winter sets in earlier than at San Blas, which lies at the western end. Rains and sickness are looked for early in March at Panama; but at San Blas rain seldom falls before the 15th of June; sometimes, however, it begins on the 1st of June, as we experienced. Of the intermediate coast I have no exact information, except that December, January, and February are fine months everywhere; and that, with respect to the range between Acapulco and Panama, the months of March, April, and half of May, are also fine; at other times the coast navigation may be generally described as dangerous, and on every account to be avoided.

From December to May inclusive, the prevalent winds between Panama and Cape Blanco (Gulf of Nicoya) are N.W. and northerly. Thence to Realejo and Sonsonate, N.E. and easterly. At this season, off the gulfs of Papagayo and Tehuantepec there blow hard gales, the first being generally N.E., and the latter North. These, if not too strong, as they sometimes are, greatly accelerate the passage to the westward; they last for several days together, with a clear sky overhead, and a dense haze near the horizon. We experienced both in the *Conway* in February, 1822. The first, which was off the gulf of Papagayo on the 12th, carried us 230 miles to the W.N.W.; but the gale we met in crossing the gulf of Tehuantepec on the 24th, 25th, and 26th, was so hard that we could show no sail, and were drifted off to the S.S.W. more than 100 miles. A ship ought to be well prepared on these occasions, for the gale is not only severe, but the sea, which rises quickly, is uncommonly high and short, so as to strain a ship exceedingly.

From Acapulco to San Blas, what are called land and sea breezes blow; but, as far as my experience goes, during the whole of March, they scarcely deserve that name. They are described as blowing from N.W. and West during the day, and from N.E. at night; whence it might be inferred, that a shift of wind, amounting to eight points, takes place between the day and

night breezes. But, during the whole distance between Acapulco and San Blas, together with about 100 miles East of Acapulco, which we worked along, hank for hank, we never found, or very rarely, that a greater shift could be reckoned on than four points. With this, however, and the greatest diligence, a daily progress of from 30 to 35 miles may be made.

LOWER CALIFORNIA.

There is no good account of the meteorology of this portion of the western coast of America. But in some measure this is of less importance, inasmuch as it has few ports, and these but very little frequented by commerce. On p. 123 some remarks by Mr. Jeffery, R.N., are given. The following are by Commander James Wood, and are in continuation of those given on page 913 *ante*.

SAN LUCAS TO SAN DIEGO.

From *Cape San Lucas to San Diego*, or from 23° to 32° N., the general direction of the wind is from West to North, but during the winter months, or from November to April, this coast is subject to violent gales from the S.E., which, as most of the bays and anchorages are open towards that quarter, are much dreaded. This is especially the case along the northern portion of this division, as towards Cape St. Lucas they are less frequent; however, they always give ample warning of their approach. The only way, therefore, of making a passage up this coast is by standing off upon the starboard tack; as you get out the wind draws to the eastward, till either the variables are reached, or you can fetch your port on the other tack. In the summer season the only alteration is that the wind is more westerly in the mornings, and draws round with the sun as the day advances.

From *San Diego to San Francisco* the wind prevails from the north-westward nearly all the year round.* This coast is subject to the same southeasterly gales as the coast of Lower California, but they are more frequent here, and blow with greater force. All its bays and roadsteads are similarly exposed, with the exception of the above-named ports, which are perfectly secure, and defended from all winds. During the winter, therefore, vessels always anchor in a convenient berth for slipping, with springs and buoys on their cables, so that on the first appearance of heavy clouds approaching from the S.E., with a swell rolling up from the same quarter (the invariable signs of the coming gale), they may be able to slip and go to sea without

* In the Gulf of California two winds prevail during the year—the N.W. from October to May, and the S.E. from May until October. During the former season fresh breezes and fine weather will prevail; when the latter brings heavy rains, oppressive heat, and sultry weather. This information was copied by Mr. Jeffery, R.N., from an old Spanish manuscript, and in his visit here in 1834 he proved its correctness.

loss of time. These gales last from twelve hours to two days, and are accompanied by heavy rain, which lasts till the wind changes, which it often does very suddenly, and blows as hard for a few hours from the N.W., when the clouds clear off and fine weather again succeeds. Off Concepcion Point gales and strong breezes are so frequent as to obtain for it the appellation of the Cape Horn of California. They are mostly from North to West, and frequently blow with great force, especially in the winter, when they sometimes last for three days together, without a cloud to be seen, till they begin to moderate. But here one of the most remarkable features of this coast first shows itself, viz., the frequent and dense fogs, which, during more than half the year, render the navigation from San Diego northward most unpleasant. In making the land, the only way to deal with them is to feel your way into the coast with the lead during the daytime, as it frequently happens that a thick fog prevails at sea, while at the same time, within a mile or two of the land, a clear, bright sky, and open horizon are to be found; if disappointed in this you have but to wear, haul off again, and heave-to till the desired change does take place.

CALIFORNIA.

A general account of the winds on the western coast of the United States, as given in the excellent hydrographical memoir by Mr. Davidson, U.S.N., will be found on pages 154-5. The U.S. Government zealously collected materials for meteorological discussion along the whole of the coast, during the survey of 1855, and these have brought out the following general results:—

1. The great prevalence of westerly winds, representing a flow of the air at the surface from the ocean in upon the land.

2. The general absence of easterly winds, showing the absence of a return current at the surface.

The proportion of westerly to easterly winds is as 8 to 1.

3. The increase of westerly winds in the summer, and their decrease in the winter.

4. That when easterly winds blow at all, it is as a rule during winter.

5. The N., N.E., and E. winds blow more frequently in the morning than in the afternoon hours.

6. The S.E., S., and S.W. winds are in general pretty equally distributed over the morning and evening hours.

7. The N.W. is the prevailing direction of the ordinary sea breeze at Astoria and San Diego, and the W. at San Francisco.

Sometimes the West wind has that character at the first-named stations, and sometimes the S.W. wind at the last named.

As some of the details connected with these observations will be of service to our readers, they are here furnished.

San Francisco.—At San Francisco the great current of air flowing from the sea to the land comes generally from the W. or S.W., rarely from the N.W.

In the period from November to March, inclusive, the West is the prevailing wind, exceeding in quantity both the others, the S.W. wind exceeding in quantity the N.W. In the period from April to October the W. and S.W. winds are nearly equal, and each exceeds the N.W.

The West wind has, in general, the features attributed to the sea breeze, beginning after the rising of the sun, increasing until after the hottest part of the day, and dying out or much diminishing at nightfall.

The West and S.W. winds are prominent features at San Francisco.

The S.W. is the prevailing wind in June and July; S.W. and West winds blowing nearly the whole of these months, not succeeded by an easterly land breeze—but rising and falling. May and August resemble each other, the N.W. and S.W. winds being nearly equal in quantity, and each less than the West wind. In April and September the N.W. wind has nearly died out. The West wind diminishes in quantity through March and February, and through October, November, and December, to January. The N.W. wind increases again from April towards December, but is very small in October and November. The S.W. wind disappears in October, reappearing in November and December, and increasing towards January. The West wind has a maximum in April and May, and another in September and October, the minima being July and January.

The North wind in December, January, and February, reaching a maximum in January, is the only other point to be noticed for San Francisco, partaking with the other places in the general absence of easterly winds, although these show themselves slightly in winter. There is also but little South wind.

Astoria and San Diego.—In general, the winds at these two places resemble each other more than those at San Francisco do either. April, May, June, July, and August have the same general character.

The N.W. wind is the summer wind, and has the characteristics of the sea breeze, but there is no return land breeze. The N.W. wind reaches a maximum in July and a minimum in December. It is the great prevailing wind of the year at San Diego. As it decreases it is generally replaced by West and S.W. winds of less quantity. In December the quantities of the three winds are nearly equal.

The resemblance of these winds at San Diego and Astoria is remarkable, the remarks just made applying generally to both places. There is, however, much less N.W. wind at Astoria than at San Diego. Except in June, July, and August, there is some South wind each month at Astoria, and especially from September through October, November, December, and February. At San Diego this is less marked, the two agreeing most nearly in quantity in March, April, and May.

The S.E. wind is a distinct feature in both places in February and March, and at San Diego in April and June.

The East wind is prominent at Astoria in January, February, and March, and the N.E. from October to January, inclusive.

Astoria has the most easterly wind, the N.E. beginning in October and blowing until February, and being replaced by the East wind in March.

The summer is the windy season on the West coast, July being one of the windiest months of the year.

VANCOUVER ISLAND, ALASKA, &c.

Captain G. H. Richards, R.N., in the excellent Pilot for the southern portion of British Columbia, has given the remarks quoted on pages 314, 315, and these with other authorities mentioned in that part of our work, will amply suffice for this portion of the subject.

Of the meteorology of the coast northward of this our acquaintance is much more limited, for, with the exception of Sitka, we have but few remarks on the wind and climate of this remote and unfrequented region. On pages 447-8 are given the general results of the observations on climate, &c., especially those derived from fourteen years' *hourly* observations at the Imperial Observatory at Sitka, the one great feature being clearly shown that the average number of wet or foggy days per annum is *two hundred and forty-five*.

Although of old date, we give here the observations of Adm. Krusenstern, which embody the experience gained up to the date of the great Pacific hydrographer's labours.

Humboldt supposes that between Behring Strait and the 5th degree of North latitude there prevail North and South monsoons, that is to say, from the month of May to that of October winds from S.S.W. and S.E. are met with, and from November to April those from North and N.E. It does not seem, however, by the voyages of Cook, Vancouver, and other navigators who have frequented the N.W. coast of America, that these winds succeed each other regularly; and if sometimes winds blow oftener from South during summer, and from North during winter, I do not think from this that we can establish a general rule; for S.E. winds are also very frequent in winter, and it is with a violent S.E. wind that winter sets in. We find, also, the opposite to the rule, and that only N.W. winds blow during summer. It is certain that the S.E. winds, whether those blowing in summer or in winter, are always accompanied by bad weather, by fogs and rain; and, on the contrary, the N.W. wind is accompanied by dry weather, and oftenest with cold weather.

I will adduce some examples, taken from the journals of the more celebrated navigators who have visited the N.W. coasts of America, to show

that the winds have here too little regularity in their direction, to give them, as Humboldt does, the name of monsoons.

Cook, while on the coast of America in the month of March, in lat. 44° , had constant and very fresh breezes from N.W., which accompanied him during his navigation towards the North until the beginning of summer; he met with, it is true, from time to time, gales from the S.E., but they were but sudden shifts, and did not commonly last more than six hours, after which the wind reverted with great force to the N.W., and it was only by means of these short breezes from the S.E. that Cook could work his way to the North. It is seen equally by the voyages of Pérouse, and Portlock, and Dixon, that southerly winds do not predominate during the summer months.

Although Vancouver, when surveying the coast of America in the middle of April, 1792, that is, towards the end of the northerly monsoon, experienced violent gales from S.E. and E.S.E., with continued rains, and, although up to 50° of lat. the winds blew continually from the southern quarter, yet when he came on to the coast in the ensuing year, following it upon the same parallel and in the same season, that is, mid-April, he met with fresh northerly winds as far as his arrival in Nootka Sound. It is true that, in the month of September, in the same year, he met with some breezes from S.E. to S.W., but he also had them from N.W. In the month of December, 1792, on the contrary, being under the parallel of Port San Diego, in lat. $32^{\circ} 42' N.$, the winds blew constantly from the South. These accompanied them to the parallel of 30° , although they ought to have blown from the North if these winds change regularly. Thus it is winds from the northward, and particularly from the N.W., which blow the most frequently, and on occasion, as Vancouver says, a great hindrance to any advance to the northward; the Spaniards, consequently, in general keep a long way off the coast, running much to the northward of the parallel of their intended destination, to arrive at it more readily. Vancouver believes that they push this precaution too far; he is of opinion that, by the aid of the land-breezes from East and S.E., the duration of which is longer, and which have also greater force than the sea-breezes, any port may be attained. This opinion of Vancouver is correct, at least for the navigation from the Bay of San Francisco, in lat. 38° to Concepcion Point, in $34\frac{1}{2}^{\circ}$, and even farther North.

Near to the Bay of Kenay (or Cook's Inlet), Kodiack Island, and Prince William's Sound, Vancouver found, in March and April, most frequently winds from N.W. and North. In May, June, July, and August, 1794, the winds often blew from S.E. and East, with great force, but not less frequently than from N.W. and S.W. Although Captain Meares had a very strong wind from S.W. under the parallel of 50° , and that during the months of June and July the winds come more frequently from South than from North, he says, nevertheless, page 234 of his Voyage, that during the

summer months westerly winds prevail as far as 30° of latitude, with as much regularity as easterly winds prevail from 30° to the equator.

I am indebted to Captain Hagemeister, of our marine, for some notice on the predominant winds and currents in this part of the globe, and which he had collected during a navigation of several years on the N.W. coast of America. These notices merit the greatest confidence, being the result of a great number of observations made with the most scrupulous exactness, particularly at New Archangel in Norfolk Bay, and at Port Ross (Port Bodega), on the coast of New California; both lie within the limits which I have given to the first zone. It results from these observations, as well as from those already cited, that northerly winds are not the exclusive attribute of winter, as those of the South are not of summer, but the contrary frequently takes place.

By the observations made at New Archangel in lat. $57^{\circ} 2' N.$, it seems that it is easterly winds, accompanied with rain and snow, that are predominant in winter. At the beginning of December there are frequent squalls and tempests, which do not occur in summer, and towards the end of this month the Auroras boreales are very strong. About Cape Chirikoff, in lat. $56^{\circ} 9'$, the currents have a constant North direction, and often with a velocity of 2 miles an hour. The direction of the current along this coast is in general towards the North; near to Port St. Francis it takes a West direction, toward Prince William's Sound and the entrance to Cook's Inlet, after which it turns toward the South, along the coasts of Kodiak. The remains of vessels shipwrecked on the American coast are often found about the southern part of the Island of Kodiak; among them those of Japanese vessels, which are recognised by the camphor-wood of which they are built.

BEHRING SEA.

There is no complete account of the climate or winds of this inclement region, and to derive it from the individual experience of the various navigators who have recorded their knowledge would but give a fallacious view of the subject, as the features of its different shores vary greatly from each other. Among the northern islands it is as humid and disagreeable as possible. Spring does not begin till May. Dense fogs prevail throughout the summer; snow falls in October, and in December the North winds bring the ice, which remains frequently till May. Further South at Behring and Copper Islands, the climate is not so rigorous, as explained on page 549.

KAMCHATKA.

Easterly winds prevail in summer, varying between N.E. and S.E., while westerly winds are constant from September till May, and are frequently very stormy. Westerly winds in summer bring bright fine weather, while easterly winds bring snow or rain.

The winds in the Gulf of Tartary, to the South of this, are described on page 580.

JAPAN.

During the stay of the American squadron in the Gulf of Yedo, from February to July, 1854, the weather was generally fine, but occasionally interrupted by strong winds and heavy rain. Northerly winds were prevalent in February, March, and April, south-westerly winds in May and July, and variable winds in June. The gales come on suddenly from the S.W. with a low barometer, and continuing for a short time, hauled round to the northward and westward and moderated. There were no easterly gales; in fact, the wind was rarely from that quarter, except when veering round from the northward (as it invariably did) by the East, to the southward and westward. In Yedo Bay the mean temperature for the month of February was 46° Fahr., and the apricot and camelia japonica were in full bloom. There were but few fogs; they commenced at Hakodadi about the 1st June, but did not extend as far southward as Simoda.

In the months of August and September, 1858—the period H.M.S. *Furious* remained in Yedo Bay—heavy gales from the E.N.E., shifting round to the S.W., and increasing in force, were frequent. Winds from West, round northerly, to E.N.E. generally brought fine weather, and rain when between S.E. and S.W.

In 1861, from the middle of June to the middle of September, there was no gale in the Yedo Gulf, but much calm weather. The latter part of September was unsettled, with a moderate gale from S.S.W. A gale occurred off the South coast, beginning with a light easterly wind and veering by South, blowing hardest at S.W., and falling at a sudden shift to N.N.W. October in the Kii channel was fine, northerly winds rather predominating, and much calm weather.

From information obtained at Yedo, it appears the prevailing winds throughout the year are to the northward of East and West, and that those to the southward generally bring bad weather; always, however, causing the barometer to fall in sufficient time to enable a vessel to obtain a 60 or 80 miles offing, should she be near the coast.

Off Yedo, in February 1863, H.M.S. *Swallow* experienced a sharp, short gale of ten hours duration, with little or no warning. The sky was very clear, with steadily falling barometer, and in two hours the ship was reduced to close-reefed main topsail, &c. Singularly clear weather is often a prognostic of a coming gale, but the barometer is the unfailing sign.

Strong winds from the S.E. are generally accompanied with thick weather and rain. At such a period it is recommended that a vessel bound to the westward from Yedo should run through the chain of islands to the southward of Van Diemen Strait, instead of passing through the strait;

for by taking this latter route, and not making sufficient allowance for the north-easterly current, she would in all probability find herself embayed on a lee shore to the northward of Cape Chichakoff and possibly of Cape D'Anville (Toyi misaki).

During H.M.S. *Saracen's* survey of the Strait of Tsugar, May, June, July, and August, 1855, the prevailing winds were from the South, with much fine clear weather. The wind was less frequent from the N.W. than any other quarter. Dense fogs prevailed in May and June; after that period they were comparatively rare.

The wind in shifting usually followed the course of the sun. After a few days of light southerly wind and fine weather it freshened, and veered to the westward, accompanied by fine clear and cold weather. At N.W. it usually died away, or flew round suddenly to the eastward; in the latter case it was always followed by a dense fog or a gale; the weather getting fine again as the wind veered to the southward.

On the West coasts of Japan, including the Japan sea, Korea strait, and the northern part of the Eastern sea, the weather is as follows:—In the spring from about March to June and sometimes in July, the winds are almost constantly from the eastward, veering between N.E. and S.E.; moderate in force, with mist and rain and gloomy skies. It frequently freshens up to a strong breeze, with squally weather generally from N.E. Calms and light westerly winds occur in small proportion and bring beautiful weather.

There are occasional strong gales, sometimes of five days' duration, the wind freshening up from the East (generally commencing from S.E.), with falling barometer, and blowing with variable force for three or four days, then chopping round suddenly to South, or veering to North and N.W., according to the quarter of the passing storm, when the gale attains its maximum force, and blows itself out in a few hours or in one or two days, according to the season. The barometer gives good warning. The gale always attains its height after the mercury has commenced to rise, and usually blows with the greatest violence from the N.W. Small cyclones of short duration are also known in June; they travel northwards, but later in the year between N.E. and East.

In summer, in the western part of the Japan sea, light easterly winds are still predominant, with much fine weather and thick fogs, but much more variable than in the spring, and subject to short, sharp breezes, veering with the sun. Towards the end of August they alternate with westerly breezes.

About the autumnal equinox, the weather breaks up between the parallels of 41° and 46° N. In the middle of September 1859, a heavy cyclone was experienced (exceeding 500 miles in diameter and progressing to the N.E.)

at St. Vladimir Bay and Hakodadi at the same time, and was the heaviest storm known at the former place for 40 years. There occurred between this and the middle of November twelve other gales, ten of which were cyclones and two "blue north-westerns," their force from 7 to 10, their duration 2 to 4 days, with intervals seldom of more than two or three days' fine weather between them; the normal direction of the wind was from S.W. to N.W., with fresh and strong breezes.

Southward of 36° North, November was fine with light N.E. and N.W. winds. The N.W. winds became prevalent towards the end of the month. At Hakodadi, they blow for four months. In 1859, during the first eighteen days of December, the wind remained between N.W. and W.S.W. almost constantly, only veering occasionally as far as S.W. and North. The weather was fine when the wind was moderate, but very fresh breezes brought rain or snow. The duration of the north-west winds in the South is uncertain.

THE ISLANDS.

The various archipelagoes and detached islands of the North Pacific are nearly all within the limits of the North-East Trade wind, and therefore the peculiarities of their meteorology are very simply explained. But as some of the chief of these groups, as the Hawaiian, the Marianas, and the Carolines, lie on the northern, western, and southern limits respectively, it has been argued, perhaps fallaciously, that all the islands have a marked effect on the direction of the general wind. But when it is considered that the area of these islands, mostly coralline atolls, is so infinitesimally small compared with the area which surrounds them, it cannot be conceded that these minute specks on the surface of the great ocean can exercise much influence on the great belt of the trade wind which blows over it.

Taking the Sandwich islands as an example, it is shown in the description of that archipelago, pages 822, 823, that lying as they do just within the northern tropic, the N.E. trade blows without much intermission for nine months in the year, and that from December to January, that is when the sun is in the highest southern latitude, they are interrupted, and that the islands then are in the horse latitudes of the tropic of Cancer.

The Ladrone islands are also exceptionally placed. For hereabout is the division of the monsoon region and that of the N.E. trades. The S.W. monsoon evidently reaches the archipelago between the middle of June and the middle of October, but is only violent and changeable for a few weeks in the beginning or end of its season. During the middle, as in August and September, the air is calm and the heat almost unendurable. This subject is further elucidated on pages 796-7.

The Caroline islands lie on the southern verge of the N.E. trades, and are

subject to all the vicissitudes of the change of seasons. Mrs. Gulick, one of a family to whom we owe much of our knowledge of the islands of the North Pacific, being the wife of a most zealous member of the Hawaiian mission, kept a meteorological register for three years, 1853—5, at Ascension, and from the results tabulated on page 737, it will be seen that N.E. trades are only interrupted between July and November, at the time when this southern margin, following the sun in its course, passes to the northward, leaving the archipelago in the belt of calms or "doldrums," but which have not the characteristic usually attributed to this zone, as the number of calm days is generally fewer than is found to be the case in the zones either North or South of them.

In the descriptions of the other group of islands will be found many notices of the climate and winds, which will be sufficient to give an idea of this simple subject.

The MONSOONS of the Western Pacific are incidentally described in our Directory for the Indian Ocean, pages 29—66, and in that for the Indian Archipelago, pages 1 to 25. To those works, which are connected with the present volume, the reader is referred for a concise account of their origin and effect.

HURRICANES are but little felt in the open ocean in the North Pacific, and do not differ in their phenomena from those experienced in other oceans. It will be therefore needless to swell the bulk of this volume, already too large, with a description of their well known features.

2. TIDES.

Except on the surrounding shores, where they exhibit similar phenomena and magnitude to other parts of the world, the tides of the Pacific are insignificant, and almost unnoticeable to the mariner. The tables which are given hereafter contain the elements of the tides necessary to navigation; that is, the hour of high water, and the rise and fall of the tide, on the coasts of America, Asia, &c. But in the vast space between these two boundaries the tidal wave is scarcely appreciable, except by refined observation, and can form but a small portion of the actuating consideration in navigation.

Under these circumstances we deem it unnecessary to enter into the general laws of the tides as founded by the illustrious Newton, or the interesting features elicited by the discussion of the late Rev. Professor Whewell and

Sir John Lubbock. The present consideration, therefore, will be confined to the general view of the Pacific tides, as set forth by the late Dr. Whewell to whom the main features of the tidal laws, as they are now known, is mainly owing.

THE REV. W. WHEWELL ON THE TIDES OF THE PACIFIC.

I shall not attempt to determine the general course of the tides in the Pacific, but will remark that the view now given of the distribution of the tides in an ocean explains several of the features of the Pacific tides, which were before very perplexing. If we suppose an ocean tide, from the borders of which proceed tides having their progress marked by cotidal lines, we can easily draw the lines so as to include the following facts and observations:—

1. The *easterly* motion of the tide wave around Cape Horn, which is established by Captain King's observations, and which is difficult to reconcile with the supposition of a tide revolving from West to East round the South pole. This is explained by its being a tide proceeding from an oceanic tide.

2. The tide being at nearly the same hour along a large portion of the coast of South America, namely, from the Strait of Magalhaens for 20° or 30° northward. This shows that the cotidal line is nearly parallel with the shore.

3. The very small tides, or no tides, at the islands in the centre of the Pacific, Tahiti, and the Sandwich islands. These belong to a central portion of the ocean, where the rise and fall of the surface nearly vanishes.

There are two sources of inaccuracy in tide observations, namely, the want of a clear understanding as to the thing to be observed, and the irregularity and complexity of the facts themselves. With regard to the former point, I hope that several misapprehensions, formerly prevalent among navigators, are now no longer common; such as confounding the time of high water with the time of the turn of the tide stream. But there is probably still some unnecessary difficulty produced by regarding, as a cardinal point in observation, the "establishment," as vulgarly understood, namely, the hour of high water on the day of new or full moon; for, in fact, the hour of high water on this day is of no more importance than the hour of high water on any other day, except in so far as it gives the means of knowing the hour on other days. And it does not afford the means of doing this any more than the hour of high water for any other given age of the moon does. For just as much inaccuracy as, from whatever cause, there is in deducing the time of high water at all ages of the moon from the time at a given age, just

as much inaccuracy is there, from the same causes, in deducing the time of high water for all ages of the moon, from the time for full or new moon. And if the time at which the tide follows the moon on two or three successive occasions be greatly and irregularly different, the observations are equally of little value, whether any of the observed tides fall on the day of the new or full moon, or do not. If the tides are regular, and the observations good, the common "establishment" may be obtained from the observations of any one day; although, to give much value to this deduction, the tides should be observed for a fortnight. And if such observations be made for a number of very distant places, the common "establishment" does not represent a corresponding fact at different places. In some places it means the time of high water one day after the highest tide; in some, the tide two days after the highest tide; in some three days; for the "age of the tide" is different at different places, and the tide which corresponds to the new or full moon comes after the new or full moon by one, two, or three days. Hence, in order that we might compare the tides of distant places by means of a fact which had the same meaning in all of them, I proposed, in a former essay, instead of taking this common establishment, to take what I then called the *corrected establishment*, namely, the *mean* of all the lunital intervals, that is, of the intervals by which the tide follows the moon's transit. In general, the corrected establishment is about thirty minutes less than the common establishment. It has been used by Admiral Lütke, in his discussion of the tides of the Pacific. As the common establishment is still the one familiar to navigators, and as no material error will result from the use of it, I shall make it the basis of my remarks on the tides of the Pacific. It may be useful to bear in mind what I have said, that this establishment may be deduced from observations not made at the new or full moon.*

I shall now proceed to give the tide hours for the coasts of the Pacific, according to the best accounts which I find, judging them in the manner I have described. After noticing the course of the tide near Cape Horn, I shall follow it along the whole western coast of America, till, in the North, we reach the Aleutian islands; and then, following this chain of islands, to the shores of Kamtschatka. I shall then consider the islands in the central parts of the Pacific, and proceed from them westward, according to my materials.

* I have here said that in cases where the tides follow the common laws we may deduce the time of high water on one day from the time on another. I might have said the same thing of the heights.

WEST COAST OF NORTH AMERICA.

	Lat. North.	Long. West.	Time H. W.	Greenw. Time.	Ratio.	Authority.
	° ' "	H. M.	H. M.	H. M.	FERT.	
Panama	8 57	....	3 20	....	..	Lloyd, Phil. Trans., 1830.
Panama Bay .....	....	5 18	4 0	....	13	Kellett.
" .....	....	....	3 36	8 54	15	Sir E. Belcher.
Nicoya .....	....	....	....	8 0	..	FitzRoy.
Island S. Lucas	9 56	5 42	3 0	8 42	6	Sir E. Belcher.
Realejo	12 28	5 48	3 0	8 48	6	Sir E. Belcher. Great irregularities.
Acapulco	16 50	6 39	2 41	9 20	1	Sir E. Belcher.
" .....	....	....	3 5	9 44	2	Du Petit Thouars.
Magdalena Bay	24 38	7 28	8 30	....	6	Sir E. Belcher. Very anomalous.
" .....	....	....	7 37	3 5	6	Du Petit Thouars.
San Blas	21 32	7 1	8 5	3 6	..	Mem. on S. America.
" .....	....	....	....	3 0	..	FitzRoy.
" .....	....	....	9 41	4 42	..	Beechey.
Mazatlan	23 0	7 10	9 50	5 0	..	Beechey.
Monterey	36 36	8 6	9 42	5 48	..	Beechey.
" .....	....	....	9 52	....	7	Du Petit Thouars.
San Francisco	37 48	8 9	12 30	....	6	Sir E. Belcher. Very anomalous. Diurnal inequality, H.W. & L.W. large in ht. and times.
" .....	....	....	10 52	....	..	Beechey & Malaspina.
" .....	....	....	10 33	6 42	6	Russian nav. (Lutke's notice).
Port Bodega	38 19	8 11	11 41	7 52	..	Russian navigators.
Columbia River	46 16	8 16	1 0	9 16	8	Sir E. Belcher.
" .....	....	....	1 30	....	..	Vancouver.
Straits of Juan de Fuca	48 0	....	12 30	....	8	Kellett.
Nootka Sound	49 36	9 2	10 40	....	12	Sir E. Belcher. Great diurnal inequalities.
" .....	....	....	12 33	9 35	12	Lutke.
F. Nicolaëfsky (Cook's Inlet)	60 15	10 6	3 49	1 55	28	Wrangell.

From this point the coast turns westward, and the stations are arranged according to longitude, without regard to their latitude.

	Lat. North.	Long. West.	Time H. W.	Greenw. Time.	Rise.	Authority.
<i>American Coast.</i>		H. M.	H. M.	H. M.	FEET.	
F. Nicolaeſky (Cook's Inlet)	60 15	10 6	3 49	1 55	28	Wrangell.
Harbour of St. Paul (Kadiack Island) ..	57 46	10 8	0 30	10 38	10	Russian navigators.
Harbour 3 Hierarq. ...	57 8	10 12	0 19	10 31	10	Russian navigators.
Nouchagak Bay	58 31	10 34	2 14	0 48	12	Wrangell.
<i>Aleutian Isles.</i>						
St. Paul Island	57 10	11 20	3 47	3 7	4	Russian navigators.
Atkha Island	52 25	11 36	0 20	11 56	5	Russian navigators,
Atton Island	52 57	12 28	0 48	1 16	22	doubtful.
<i>Kamtschatka.</i>						
Petropaulovski	53 1	13 26	3 38	5 4	4	Lütke, in 1827.
" .....	....	....	3 43	5 9	..	Lütke, in 1828. Diur- nal inequalities.
" .....	....	....	3 54	....	3	Du Petit Thouars.

Looking at the general assemblage of the numbers which occur in the column marked "Greenwich time," it is evident that the tide wave of the hour 8, which is at Ocos island and the Galapagos about eight o'clock, comes to the continent at Nicoya and Realejo, about 10° and 12° North lat., at about three-quarters of an hour later; while the tide is at hours later than this, both to the northward and the southward. Proceeding first southward, we find the line of 11 not far from Callao, that of 2 near Coquimbo or Valparaiso, and that of 3½ near Valdivia; and farther South we have the line of 5 at Chiloe, and of 6 at Cape Pillar; whence the wave moves to the eastward, round Cape Horn, as already stated. Considering these points as fixed, it is easy to interpolate the other cotidal lines along this coast. The observed hour at Guayaquil is later than its position would give, a result which we should expect, since the tide will occupy some time in travelling up the gulf in which Guayaquil is situated.

Again, proceeding from Nicoya and Realejo, to the northward, we find a like progression of tide hours. The line 10 is not far from Acapulco, according to the data here collected. But the tide at Acapulco is small, and hence the accuracy of the result is doubtful. Perhaps the smallness of the tide is an indication that the point of divergence of the tide wave, which occurs on this part of the American coast, is not far from Acapulco. It appears that the line of 3 passes near San Blas, and also near the Bay of S. Magdalena, on the coast of California. At Mazatlan, somewhat within the Gulf of California, the time is an hour or two later, as we should expect. When we reach Monterey and San Francisco the hour is about 6, according to Captain Beechey's observations. The more recent ones are too anomalous to proceed upon. At Port Bodega, in lat. 38°, we have the 8 tide line; and at Nootka

Sound, Cook's observatory, which give $12^h 30^m$ (whence Greenwich IX nearly), are confirmed by Captain Kellett's observations in the Straits of De Fuca, South of Vancouver's island. The next point is the Russian settlement, New Archangel, in the island of Sitka, where the tides exhibit very curious features, as I have already stated from the observations of Admiral Lütke, and, as I find, further confirmed by the observations of Sir Edward Belcher. The line belonging to Sitka appears to be $12\frac{1}{2}$.

From this point we depend upon Russian observations, which are given by Admiral Lütke in his "Notice." These enable us to see that the cotidal lines bend, as usual, deep into the head of the bay in which is Cook's River (Inlet), in lat. 60° . The coast here trends to the West, and the wave follows it, and pursues its course along the chain of the Aleutian islands, where it is traced by Admiral Lütke and the navigators of the Russo-American Company. It appears that the lines of 11, 12, 1, 2, fall near this chain, and that the line of 5 is near the coast of Kamchatka. It is not difficult to arrange the cotidal lines so as to conform to these data.

Admiral Lütke has observed the tides at other places on the Asiatic coast, as far North as 65° , but I shall not attempt to arrange them.

Our next attempt must be to arrange the tides of the oceanic isles of the North Pacific.

ISLES OF THE NORTH PACIFIC.

	Lat. North.	Long. West.	Time H. M.	Greenw. Time.	Rise.	Authority.
<i>Sandwich Isles.</i>		H. M.	H. M.	H. M.	FEET.	
Honolulu	21 18	10 32	3 35	2 7	2	Du Petit Thouars.
<i>Caroline Isles.</i>						
Ualan	5 15	13 7	3 35	4 42	5	Lütke.
<i>Ladrone Isles.</i>						
Guahan	13 32	14 20	8 23	10 43	..	Freycinet.
Bonin Isles	26 52	14 29	6 43	9 12	3	Lütke.
.....			6 3	....	..	Beechey.
Loo-Choo Isles	26 30	15 28	6 28	9 56	6	Beechey.
Sand Isle, Sanboanga	6 55	16 52	7 36	11 28	4	Sir E. Belcher.
<i>Bashee Group.</i>						
Batan Island	22 0	15 50	....	....	..	Sir E. Belcher.
Corean Archipelago ..	34 17	15 51	4 49	8 40	13	Sir E. Belcher. Anomalous.
Patchusan	26 20	15 41	6 36	10 17	5	Sir E. Belcher. Diurn. inequalities.
Hong Kong	22 12	16 23	9 37	2 0	6	Sir E. Belcher. Diurn. inequalities.
Amoy Harbour	24 16	16 8	12 52	5 0	18	Captain H. Smith.
Santubon	1 48	16 39	4 21	9 0	12	Sir E. Belcher.

North Pacific.

These observations appear to imply a general motion westward of the tidal wave; but I conceive that they are much too far and too unconnected to justify me in drawing cotidal lines; besides which, the smallness of the tides in the central parts of the ocean makes the observations more than usually doubtful, and is accompanied by some circumstances inconsistent with the notion of a simple progressive wave as the representation of the tidal phenomena of those seas. I will consider those circumstances for a moment.

Tides of the Central Pacific.

The tides over a great portion of the central part of the Pacific are so small that we may consider the lunar tide as almost vanishing. Thus, at Bau Island, it is stated as only 1 foot; at Tahiti it is hardly more; at the Sandwich islands it is 2 feet; and even at New Ireland, where we are no longer in the central space, but among the larger islands to the West of it, the tide is only about 2 feet. But moreover, at some at least of these places, the tide, small as it is, is not the *lunar* tide following the usual laws. At Tahiti for instance, the time of high water appears never to deviate from noon by more than a certain difference, although Sir Edward Belcher has shown that it varies from about 9 a.m. to 3 p.m. At Bau island there appears reason to believe that the limits are much the same; and perhaps at Carteret's harbour, in New Ireland. Now it will be easily seen that such a result as this would follow if we were to suppose the tidal influence of the sun and of the moon to be equal. On this supposition it is plain that the high water would always occur halfway between the sun's transit and the moon's transit. Hence at new moon the high water would be at noon; as the moon went away to the eastward of the sun, the tide would be later and smaller; till, when the moon was six hours' distance from the sun, the tide would be at 3^h, but would in fact vanish. After this point the tide would re-appear at 9 a.m., or a little later, the inferior transit of the moon now taking the place of the superior one in determining the tide; and from this time the tide would be gradually later and larger till at full moon it would be again at noon; and so on. This appears to agree pretty well with the phenomena of the tides at Tahiti, as determined by Sir E. Belcher.

A more minute examination of the tides in these regions will enable us to pronounce more decidedly whether the law of the phenomena is that which has been just stated. And if it appears that the phenomena do follow this law, we shall have further to consider how such a motion of the sea in those parts is to be combined with the very different movements which occur in other places, and what is the general movement of the ocean which they indicate; whether, for instance, they are best explained by looking upon the lunar and solar parts of the tide, as produced by two separate waves, which may increase and diminish separately, and may start from different epochs

in their motions. I shall not now pursue this point further; nor shall I further examine how far the phenomena approach to the cases of fluid motion already described, in which there is a marked wave at the outskirts of the mass, and an approximate quiescence of the surface in the central parts; namely, the case of a stationary undulation, and of a revolving undulation, or rather a revolving cotidal line. I may remark, however, that the latter supposition, that of a revolving undulation, by which the tide is carried from California northwards along the American shore, and to the coast of Kamchatka, while the cotidal lines converge to some central point in the North Pacific, would explain the smallness of the tides at the Sandwich islands.

The foregoing is that portion of Professor Whewell's important scientific contribution which refers to the North Pacific. Although some minor details may be modified by more recent observations, still, as the arguments are based on correct data, the conclusions remain unimpeachable. We have, therefore, deemed it right to repeat them in the present edition.

The following *Tide Table* is derived from the Admiralty lists, drawn up by Commander Burdwood, R.N., and give all that is necessary for the navigator.

TIDE TABLE.

Place.	High Water, Full and Change.	Rise. Springs	Place.	High Water, Full and Change.	Rise. Springs
H. M.	FT.		H. M.	FT.	
<i>Central America, West Coast.</i>			<i>Mexico, West Coast.</i>		
Chepo River.....	3 40	16	Port Guatulco.....	1 30	5
Pedro Gonzales (Trapichi Island).....	3 50	16	Port Sacrificios.....	3 15	6
Chamé Bay.....	4 0	16	Acapulco.....	3 6	1½
Saboga.....	4 0	14	Perula Bay.....		7
Panama Road.....	3 23	15-22	San Blas.....	9 41	6½
Port Nuevo.....	3 10	12	Mazatlan.....	9 40	7
Parida Island.....	3 15	10½	Guaymas Harbour.....	8 0	4
Nicoya Gulf (Port Herradura).....	3 9	10	<i>California and Washington Territories.</i>		
Port San Juan del Sur ..	3 8½	10½	San Lucas Bay.....	9 20	9½
Port Realejo.....	3 6	11	Magdalena Bay.....	7 35	6½
Port la Union, Gulf of Fonseca.....	3 15	10½	Port San Quentin.....	9 5	9
Acajutla Road.....	2 25	9	Port San Bartolome ..	9 10½	7-9½
			Playa Maria Bay.....	9 20½	7-9½

Place.	High Water, Full and Change.	Rise. Springs	Place.	High Water, Full and Change.	Rise. Springs
	H. M.	FT.		H. M.	FT.
Cerro Island	9 10	7-9	Hernando Island, Strait of Georgia	6 0	12-14
Sta. Barbara Island	8 0	3½	Rendezvous Islands	7 0	14
San Diego Bay	9 38	5	Stuart Island	6 0	12-14
San Juan Anchorage	9 40?	5	Waddington Harb., Bute Inlet	6 0	13
San Pedro Anchorage ..	9 45	4½	Gowland Harbour, Discovery Passage	5 30	11
San Miguel (Ouyler Harbour)	9 25	5	Seymour Narrows	4 0	11
San Rosa Island	9 30?	5½	Cameleon Harbour, Nodales Channel	3 0	16
Santa Catalina Island ..	9 35?	5½	Forward Harbour	3 0	16
San Luis Obispo	10 8	4½	Beaver Creek, Loughborough Inlet	3 0	16
Monterey	10 22	4½	Knox Bay	12 0	16
South Farallon	10 37	4½	Port Neville	0 30	17
San Francisco, North Beach	12 6	4½	Beaver Cove		15
Drakes Bay	11 41	4½	Alert Bay, Cormorant Island		15
Bodega Port	11 17	4½	Nimkish River	0 30	14
Humboldt Bay	12 2	6½	Beaver Harbour	0 30	15½
Port Orford	11 26	6½	Shushartie Bay		12
Columbia River entrance	0 15	7½	Bull Harbour, Goletas Channel	0 30	12½
Astoria	0 42	7½	Deep Harbour, Fife Sound	12 0	16
Nee-nah Harbour	12 33	7½	Cullen Harbour	12 0	16
Port Townshend	3 49	5½	Quatsino Sound, Vancouver Island	11 0	11
Fort Steilacoom	4 46	11	Klaskino Inlet	12 0	12
<i>British Columbia and Vancouver Island.</i>			Klaskish Inlet	12 0	12
Sooke Harbour	2 0	8	Naspartie Inlet	12 0	12
Esquimalt Harbour*	irr.	7-10	On-Ou-Kinsh Inlet	12 0	12
Victoria Harbour*	irr.	7-10	Kyuquot Sound, Vancouver Island	12 0	12
Roche Harbour, Haro Strait	irr.	12	Esperanza Inlet, Vancouver Island	12 0	12
Port Discovery	2 30	7	Nuchatlitz Inlet, Vancouver Island	12 0	12
Nisqually, Puget Sound..	6 0	18	Nootka Sound, Vancouver Island	12 0	12
Drayton Harbour, Somah-moo Bay	2 0	12	Barclay Sound	12 0	12
Fraser River (entrance)..	6 30	7-10	Clayoquot Sound	12 0	12
Burrard Inlet, Gulf of Georgia	6 0	16	<i>Alaska, or North-west America.</i>		
Plumper Cove, Howe Sound	noon.	12	Duncan Bay, Chatham Sound	12 0	21
Port Graves	noon.	12	Port Kuper	1 40	13
Stuart Channel (Cowichin Harbour)		10-12	Port Simpson	0 35	21½
Nanaimo Harbour, Gulf of Georgia	5 0	14	Portland Inlet (Salmon Cove)	1 8	16
Nanoose Harbour, Vancouver Island	5 0	15	Sitka†	0 34	6-7
Pender Harbour, Strait of Georgia	6 0	13			
Port Augusta	5 0	12			

* May to October, from midnight to 3 a.m. November to April from noon to 3 p.m.

† The rise at Sitka as given by Commander Pearce, H.M.S. *Alert*, in his remarks in 1860, does not exceed 7 feet, but on the authority of Commander Pike, H.M.S. *Devastation* (1862), the local pilots say that the rise sometimes is as much as 16 feet.

TIDES IN THE NORTH PACIFIC OCEAN.

933

High
Water,
Full and
Change.Rise,
Springs

H. M. FT.

6 0 12-14
7 0 14
6 0 12-14

6 0 13

5 30 11

4 0 11

3 0 16

3 0 16

3 0 16

2 0 16

0 30 17

0 30 15

0 30 15

0 30 14

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0 30 12½

12 0 16

12 0 16

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12 0 12

12 0 21

1 40 13

0 35 21½

1 8 16

0 34 5-7

Place.

High
Water,
Full and
Change.Rise,
Springs

Place.

High
Water,
Full and
Change.Rise,
Springs

Behring Bay 0 30 9
Port Etches 1 15 9½
Port Chalmers 1 0 13½
Port Chatham 1 0 12
Ounalashka Island 7 30 7½
Cape Roshnoff 7 30 15
Good-news Bay 6 15 13½
Golovnin Bay 6 23 3½
Port Clarence 4 25
Chamisso Island 4 42
Point Barrow 11 45 ½-¾

Kamchatka.

Avatcha Bay 3 30 6½

Gulf of Tartary.

Cape Maria (Saghalin Id.)
Sea of Okhotsk 2 0 5
Amur Strait 11 40 5-6
Jonquiere Bay (E. coast) 10 0 6
Castries Bay 10 30 6
Barracouta Harbour 10 0 3½
Port Michael Seymour 5 30 3
Napoleon Road (W. coast) 2 30 2½
St. Vladimir Bay irr. 2

Japan.

Nagasaki Bay (Nipon, S. Coast) 7 15 9
Tama no Ura Harbour, Goto Island 6-8
Iki 8
Tsu-sima Sound 8 30 8
Simonosaki 8 30 8

Sado (Yobisu) 5 0 2
Tsugar Strait 5 0 5
Hakodadi Harbour, Yezo Island 5 0 3
Endermo Harbour, Yezo Island 5 30 6
La Perouse Strait 10 30 6
Yoku-hama, Yedo Bay 6 0 6½
Tatsumi Bay 5 50 5
Tatsuzo 6 0 5
Port Simoda 5 0 3-5

Heda Bay 5½
Enora Bay 4
Simidzu 7
Urakami 7 30 6
Oosima 6 50 5
Tanabé Ki Channel 6 0 6
Uranouchi 5
Osaki 5 55 6½
Hiogo and Corvi Bays 7 15 5½
Oosaka River (entrance) 7 30 5½
Oosaka City 8 17 2½
Kata Channel 6 4 6½
Yura Harbour 6 5 6½
Naruto (Fukura) 6 17 7
Akasi 6 36 6½
Awajima (Inland Sea) 0 14 7
Tomo (Seto-uchi) 11 0½

Islands.

Karakakoa Bay, Owyhee 3 49
Honolulu, Sandwich Ids 4 0 2
Pouinipet Island, Caroline Islands 6 0 4½
Saipan Island (Ladrone Islands) 6 45 2½
Pelew Islands 6

noon to 3 p.m.

in his remarks in

M.S. Devastation

3. CURRENTS OF THE NORTH PACIFIC OCEAN.

We have in many places in the other volumes of this series described the general system of ocean currents, and the causes which set them in motion, as far as is known, that but little need be said here on the subject. The North Pacific is the most simple in the arrangement of its currents. It is a basin of circulation, around a central area, lying along the tropic, analogous to the Sargasso Sea in the North Atlantic, and having the same feature of a broad equatorial stream setting westward, with more or less constancy, between 8° or 10° North and the tropic, a reverting and strongly marked current, the Japanese current similar to the Gulf Stream, and a broad extra-tropical belt setting generally eastward, but subject to much fluctuation.

But the North Pacific differs from the North Atlantic in not encountering any arctic influences. Behring Strait is too narrow and shallow to allow either the waters of the Pacific to flow into the Arctic basin, as is the case with the warmer waters along the western coast of Europe, or to permit the ice bearing streams from the polar basin to flow down to the Pacific, as does the Labrador current. These varied changes are almost inappreciable here.

There is some evidence of this in comparing the specific gravity of each ocean (which comparison however cannot be said to be definitive, as the North Atlantic has had much more extended observation bestowed on it*), the mean specific gravity of the North Atlantic being 1.02664, while the North Pacific, retaining its own vapours, so to speak, is 1.02548.

As has been stated in a former page (906), the area of the Pacific is so great that the forces which act upon the waters of the smaller oceans, the Atlantic and Indian Oceans, exert a much more marked effect on them than they do on the currents of the Pacific. It is the same with the winds, and thus its meteorology exhibits but few of those grander features which may be found elsewhere, and pre-eminently characterise it as the "Pacific" Ocean.

On this account the ocean currents are of less importance to the navigator except in a few regions, such as near the Gulf of Panama, the coast of Mexico, or the southward of Japan. Elsewhere they seem to exert no

* There is another element of fallacy in these observations for specific gravity. They are frequently, perhaps generally, taken near the surface, or in that film of ocean water most liable to fluctuation from evaporation or deposition. If a uniform series of observations were taken, at a depth of say 50 fathoms, below all local disturbance, it may be predicted that there will be found the greatest uniformity in the constitution of ocean water all over the globe.

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very definite influence on a ship's course. What follows is chiefly from our first edition.

THE NORTH EQUATORIAL CURRENT.

The Northern Equatorial Current extending to the mean latitude of 24° North, is subject to the variations experienced in the southern portion of this extensive drift.

In its eastern portion there is no well-marked origin, as is the case in the Peruvian current flowing to the N.W. and westward at the Galapagos islands. On the contrary, as is elsewhere remarked, the Mexican coast currents are comparatively weak and undecided, so that there is *some* source from whence the westward tendency of the ocean is derived, beyond the apparent effects of the trade-wind and the action of the suns' heat.

Whether it is the effect of heat, or from the continued action of the trade winds, one fact seems to be tolerably well determined, and that is, in the circulation of the oceanic waters around their respective basins, the greatest velocity or force of the currents is at their *outer* limits; this force gradually diminishes within the area, and leaves a space not acted on by the circulatory movement, and which area, by analogy, we should expect to find of a higher temperature than might be calculated on if the polar streams should not add their lowering influence. Following this theory we must expect to find them in greater force nearer the equator, a fact apparently established. And in the central portion of the North Pacific there does not appear to be any regularity of the set of the waters, and the limit before assigned may even be too high, as the Sandwich islands, in lat. 20° , do not appear to be surrounded by any permanent current.

The following remarks by Captain Wilkes is confirmatory of this;—After passing the parallel of 10° N. we began to feel the effects of the current that is ascribed to the influence of the trade winds, and this continued without much diminution of strength until we lost the trades in lat. 19° N. The drift of this current was 271 miles in a direction S. 77° W.—Vol. v., p. 476.

Captain Wilkes continues:—"At the Sandwich islands I am not disposed to think, from any observations I had an opportunity of making, that there are any regular currents, or any set of the waters, except what is caused by the winds. There is, in fact, rarely any difficulty in beating to windward; the time of passing between the islands is about the same at all seasons of the year; and I found none in beating up to my port in any reasonable time after falling to leeward of it. Their position is assimilated to St. Helena. The temperature of the waters around these islands is about the same as that which prevails in the ocean in the neighbourhood, a fact which I consider to be a proof that no polar current reaches them." The circumstance of pine

timber being drifted on to the East end of Kauai, as noticed on page 852, would almost prove, beyond a doubt, that the currents were, at times, to the south-east from the coast of America, where the timber apparently came from; but another circumstance, equally conclusive in an opposite direction, is the drift of a Japanese junk, as related presently.

Our observations on the set of the waters to the West of this, between lat. 10° and 20° N., need be but few. That westerly currents are those prevalent is undoubted; but their northern limits, or velocity and regularity, do not appear to be well known.

Kotzebue, when he first saw the Marshall islands in 1817, intended to have examined them, but he was drifted through them by so strong a current to the West, that he could not recover his position.

The currents at the Marianas are also subject to great variations. Captain Golownin met with a rapid current, bearing to the N.E., though the wind blew from that quarter, and a Spanish officer affirms that a similar current generally flows at this part. It is probable that the westerly monsoon, which is felt at the Marianas, from the middle of June to the middle of October, according to Freycinet, may cause a reversion of the usual current.

Captain Marchand, in *La Solide*, when to the eastward of Tinian, in long. $148^{\circ} 14'$, to $148^{\circ} 34'$, calculated that he had been set 41.6 miles to the eastward in 48 hours; this was on Nov. 2—4, 1791. —(Fleurieu's Voyage of Marchand, vol ii, p. 420.)

The American Expedition found the currents strong to the northward and westward, to the N.E. of the Mariana islands. —(Vol. v, p. 268.)

The parallel of 30° N. is a favourite one with the whalers, as Captain Beechey states (vol. i, p. 236), and it is hereabout that we might look for that line of demarcation which separates the easterly and north-easterly drift of the ocean waters, occasioned by the trade winds. According to Captain Wilkes, great quantities of janthina, the soft mollusc of which serves as food for the whale, were found on the verge of the trade, in lat. 26° N., long. 168° W., the trade having failed a degree to the southward. Again, when the Expedition was in about lat. 30° N., long. 180° , vast quantities of anatifa, another mollusc, were found to lie in a W.S.W. and E.N.E. direction. —(Vol. v, p. 109.)

This arrangement of their locality would certainly appear to indicate some combined influence of current. The temperature of the adjacent water is not stated, but it is probable that some variation would have been found to the northward and southward of this line of zoophytes. We have not materials wherewith to pursue this subject further; nor have we any distinct notion of the set of the currents, if any, to the westward of the Marianas. But it is certain that the equatorial current reappears in the form of a warm N.E.

current to the South of the Japanese Archipelago, the progress of which will be presently traced.

THE EQUATORIAL COUNTER CURRENT.

In our general remarks on the winds on page 908, it is said that in the aerial systems of the Pacific, as elsewhere, there was a space between the two great belts called the N.E. and S.E. trade winds, in which the wind was variable and light, and in which calms and rains prevailed. This zone of variable winds, as they are known, is affected, in their breadth and latitude, by the annual progress of the sun in the ecliptic.

In the current systems we have a precisely analogous phenomenon—that of a body of water moving with more or less regularity to the eastward, bounded to the North and South by currents moving in the opposite direction. This counter current has been traced, with considerable certainty, nearly across the entire breadth of the Pacific: and the ensuing extracts will explain its character. The first is the observation made by Captain Lütke, in his traverse in the *Seniavine*.

After crossing the parallel of 30° , in long. 81° , we had for forty-eight hours, and during light winds and calms, a weak current between N. and N.W.; and then for a fortnight, from lat. 28° S., and long. 116° , that is for a space of 2,400 Italian miles, we scarcely felt any current at all. In lat. 26° we had a S.E. wind, which passed insensibly to the condition of a true trade-wind, and which even sometimes blew freshly, but all this did not produce any current; during two or three different days we had a weak current to the West, following the wind, and for as many days returning against the wind. In the course of this fortnight the difference between this estimated longitude and that by the chronometer did not exceed $20'$, and there was none in latitude.

Between lat. 10° and 2° S., there was for four days, during which the trade wind, without blowing strongly, was constant and equal, a tolerably strong westerly current, the mean velocity of which to the West by North was 17 miles in 24 hours.

In lat. 2° South, the trade wind left us, and the current shifted also to the East, then to N.E., and again to S.E., but more to this last quarter as far as 8° or 10° North latitude, where the N.E. trade stopped it. The mean effect of this current was East 6° South, $12\frac{1}{2}$ miles in twenty-four hours.

For the sixteen days that the current just spoken of lasted, there were but two which showed any exception, but to compensate they were very striking; this was between lat. 1° and 4° N., where the currents drifted us, in forty-eight hours, 75 miles directly to the N.W., in extremely light airs between East and S.E., and sometimes during almost an entire calm.

This easterly current could here be attributed to light, variable winds coming from the western quarter, but the same thing occurred in the neighbourhood of the Caroline islands, when the N.E. trade wind blew constantly and sometimes with considerable strength. In approaching the island of *Ualan*, we found a S.E. current in lat. 8° , and long. 163° E. To the West of this meridian the easterly current did not extend toward the N. beyond the parallel of 7° , and toward the South, in general, beyond that of $5\frac{1}{2}^{\circ}$. Between these parallels, and as far as long. 162° E., in the course of more than three weeks (in January), we did not once have westerly currents, but always to the East, inclining to the South in the eastern moiety of this space, and more to the North in the western half. There was no exception to this order, except between the *Séniavine* islands, where the neighbourhood of coasts and the action of the tides might easily interrupt the regularity of the usual currents. Its mean effect, during these three weeks, was 8.3 miles in the 24 hours to the E. by N.

We had no sooner passed to the North of the parallel of $6\frac{1}{2}^{\circ}$, in long. 152° E., than we got into a strong current to the West, which did not leave us afterwards. To the West of 152° E. we did not get but once to the South of the parallel of 7° (from the 9th to the 12th of April, in long. 144° East), and we also found the current inclining to the East. To the South of the parallel of 5° , on the meridian of the island of *Ualan*, the current bore chiefly to S.W., but then once, in lat. 3° , the current was to the E. 13 miles in 24 hours.

A zone of easterly currents, between the constant westerly currents, as well in the western as in the eastern part of the Pacific, has also been noticed by other navigators. Captains Hunter and Wilson found it more to the South than we did, in the limits of the Caroline Archipelago. Captain Duperrey, between lat. 2° and 6° North, and 7° to 10° East of *Ualan*, had currents to the S.E. and N.E., but on approaching this last island, they were still more to the S.W.; again, between the equator and $8\frac{1}{2}^{\circ}$ N., and long. 148° E. and 137° E., he re-found the easterly currents. Admiral Krusenstern places the limits of this East current, meridionally, at the equator, and the parallel of 6° ; from our experience, these limits are 5° and 7° , although in long. 163° E. we had already met with them. Captain Freycinet found strong East currents between the latitudes of $9^{\circ} 20'$ and 4° N., and long. 149° and 144° W. Captain Beechey, in his route from the Society islands to the Sandwich islands, found between the equator and 4° N., where he got into the N.E. trade wind, a N.N.E. current, the mean activity of which was 18 miles in twenty-four hours. Captain Wendt, in the Prussian merchant-ship *Princess Louise*, found in three different years, between the parallels of $6^{\circ} 30'$ N. and $10^{\circ} 30'$ N., and long. 125° and 131° W., currents from the N.E. quarter, of a velocity of from 17 to 25 miles. From all appearances, these easterly currents have some connection with each other; but we do not

yet possess a sufficiently large number of facts from which to deduce a general view of the subjects.

To the North of this eastern current, within the limits of the easterly winds, we also found a constant current to the West, inclining in some parts towards the North, in others to the South. Between the parallels of 7° and 9° , where we passed at different times more than a month, the currents constantly bore away between W.S.W. and W. by S. In the months of February and March, between long. 152° and 146° , their mean force was, in 11 days, of 15 miles in twenty-four hours, to S. 83° W.; between long. 147° and 144° , in the same interval of time, of 8 miles to S. 71° W. In November and December, between long. 156° and 140° , in sixteen days, of 14.4 miles in twenty-four hours, to S. 79° W. Farther on, towards the West, in our route to the China Sea, we experienced nearly the same currents, their direction and force being in general 16 miles in twenty-four hours, to S. 70° W.

To the North of lat. 9° the currents inclined more to the West of North. In the eastern half of the Pacific (between long. 130° and 146° , from lat. 10° to 30°) we found their general direction to be N. 86° W., and their force 11.7 miles in twenty-four hours. In the western half, on our route to the island of Guahan, their general direction, in the interval of four days, was found to be N. 75° W., 22 miles in twenty-four hours; and on our return from the Caroline Archipelago, under the same apparent circumstances, and in the same interval, S. 49° W., 22 miles in twenty-four hours. In leaving the Carolines in April, as far as lat. 22° , where the trade winds left us (from long. 143° to 139° E.), we had constant westerly currents, the general action of which, in ten days, was N. 52° W., 18.3 miles in 24 hours; and in returning from the North to this archipelago in November, we had these N.W. currents for the greater part of the time, up to the period of our meeting with the trade winds, in lat. 26° (long. 199° to 204°); and we found their mean rate in nine days to be 14.7 miles in twenty-four hours, to N. 69° W. On the meridian of the island of Ualan, on the contrary, as far as the parallel of 28° , also in November, the general direction of the current was S. 43° W., 18 miles in twenty-four hours.

We did not observe that the direction or strength of the trade winds determined the direction of the current to the North or South of West. These different inclinations occurred with winds perfectly the same; we must, therefore, rather seek the reason in some local circumstances if they should not proceed from some general and permanent cause, and are not an accidental phenomenon, changing without order.

A correspondent of the "Nautical Magazine" also speaks of this reverse current:—In July, 1833, on the equator, in long. 175° E., a current of about 2 or 3 knots an hour ran to the eastward for fourteen or fifteen days, although the wind was then fresh from the eastward; and it was thought that

such changes have generally occurred once a year, probably induced by a strong S.W. or westerly monsoon in North latitude, reaching at this time near the line. They are fitful changes, and not to be depended on, nor can their extent to the eastward be stated.—(Nautical Magazine, January, 1843, p. 5.)

Captain Wilkes says:—"On our route to the northward we crossed a stream setting to the westward, which extends as far westward as the Kingsmill group, between lat. 2° S. and 3° N., after which we encountered another, setting with equal velocity to the East, between lat. 4° and 9° N. This last tropical counter current was traced by us between the same parallel nearly across the Pacific, from the long. of 170° E. to the long. of 138° W. We had no opportunity of ascertaining ourselves whether it exists to the westward of the Mulgrave islands. But Horsburgh, and several other authorities, mention the prevalence of an easterly current as far to the West as the Sea of Celebes, and particularly in lat. 4° N."—(Vol. v., p. 476.)

At the Gilbert Archipelago, during violent gales from S.W., which prevail from October to April, trunks of large trees are thrown upon the West sides of the islands, together with large lumps of resin, similar to that found in the soil of New Zealand.

Captain Bristow found the current strong from West to East at the Purdy Islets, in February and March, 1817.

The following remarks are by Admiral Krusenstern:—

"This current, bearing from West to East, forms to the North of the equator a zone which extends to the 6th degree of latitude, and the velocity of which is frequently 20 leagues in the twenty-four hours. Ships returning from China in the opposite season, that is, during the S.W. monsoon, and proceeding by the Pacific Ocean towards the Strait of Ganem, do not generally go farther towards the East than the Pelew Isles; but if they do not pay great attention to this current, they will usually be carried several degrees towards the East. The best means of avoiding this stream of current is to attempt to cross it as quickly as possible from North to South, because South of the equator the S.E. trade is met with, accompanied by a current bearing to the West, the rate of which, near the coast of New Guinea, is from 15 to 40 miles in the twenty-four hours, in a West and W.N.W. directions."

Sir Edward Belcher inferred the existence of this easterly current on approaching Clipperton island, as noticed on page 78*q ante*. The island is in lat. $10^{\circ} 17' N.$, long. $109^{\circ} 10' W.$ He says:—"No living trees were seen, but the whole island was covered with gannet, boobies, frigate pelican, and several kinds of tern, which had also been noticed in great numbers during the previous week, at least 500 miles to the eastward. From this an easterly

current may be inferred, as these birds generally keep in its stream or tail course."

Vancouver found a strong current (2½ knots), setting to the eastward and N.E. when off Cocos island, as mentioned hereafter.

These observations will demonstrate that between lat. 4° and 10° N., which limits may be subject to some fluctuation, there is a current running to the *eastward*, or against the usual course of the inter-tropical winds and the drift of the ocean on either side of it, and extending from the western extremity of the Pacific as far as long. 115° W., and perhaps beyond this, if the Peruvian cold current should not extend beyond that latitude in this meridian.

THE JAPANESE CURRENT.

The movements of the waters, as well as of the atmosphere, seem to be on a more limited scale, and less decidedly marked, in the northern Pacific than they are in the southern hemisphere. This is probably owing to its comparatively enclosed character. From this cause it deserves, in some degree, the title of Pacific, and its navigation is not attended with any difficulty, as any ordinary ship may, with perseverance, work to windward in its central portion.

But toward its western side the movement of the ocean becomes manifest, and we find a great analogy in this respect to that of the North Atlantic, and accordingly, a very distinctly characterized current in the Pacific follows a parallel course to that of the Gulf Stream, well known in the Atlantic.

From the different configuration of the land, however, the absence of any western barrier, such as the Mexican coast presents to the western progress of the Atlantic waters, and the contraction of its channel by the Bahama Islands, this Pacific Gulf Stream has not such a distinct character as is seen in the Gulf of Florida. Still this warm ocean river may be traced in its course by observation and analogy around the northern side of the North Pacific.

This current, in the earlier part of its course, has been noticed by several navigators, especially Captains King, Krusenstern, and Broughton, whose remarks will be given presently.

The first point which may be noticed in it is the authority of the Japanese charts. On all of them, as shown by Von Siebold and Krusenstern, between Fatsizio and the Mokiera Islands, that is, off the S.E. part of Nipon, South of Jedo, the capital, a current to the *eastward* is marked, called the *Kuro Siwo Stream*, or as Krusenstern calls it, *Kourosegawa*, or the *Current of the Black Gulf*. The latter adds this remark:—"This current is 20 matsi (five-ninths of a Japanese *ri*, that is, about three-quarters of a mile) 15 miles

broad. For 10 matsi it has a very rapid course. In winter and spring it is very difficult to navigate, but in summer and autumn vessels can pass it."

Captain Gore, after the deaths of Captains Cook and Clerke, returned from the northward in the *Resolution*, making the coast of Japan in the beginning of November, 1779. Captain King states that, in this passage, when they approached the S.E. part of Japan, they were drifted by a strong current from the S.W., and that when they reached the latitude of $35^{\circ} 43'$, in eight hours, instead of making a course of 9 leagues to the S.W., they had been carried 8 leagues from the position they had left in a diametrically opposite direction, giving a velocity and direction to the current of at least four miles an hour to the N.E. by N., the longitude being $141^{\circ} 16'$. Capt. King makes the following comments on this:—As the strong currents which set along the eastern coast of Japan may be of dangerous consequence to the navigator who is not aware of their extraordinary rapidity, I shall take leave of this island with a summary account of their force and direction, as observed from the 1st to the 8th of November. On the 1st, at which time we were about 18 leagues to the eastward of White Point, the current set N.E. by N., at the rate of 3 miles an hour; on the 2nd, as we approached the shore, we found it continuing in the same direction, but increased in its rapidity to 5 miles an hour; as we left the shore it again became more moderate, and inclined to the eastward; on the 3rd, at the distance of 60 leagues, it set to the E.N.E., 3 miles an hour; on the 4th and 5th, it turned to the southward, and at 120 leagues from the land its direction was S.E., and its rate not more than $1\frac{1}{2}$ mile an hour; on the 6th and 7th it again shifted round to the N.E.; its force gradually diminishing till the 8th, when we could no longer perceive any at all. This calculation would make it about 250 miles broad off this part of the Japanese coast.

The next authority we shall quote for it is Admiral Krusenstern, who passed to the eastward of the islands, September, 1804. From the introductory portion of his great work we extract the following:—

The currents constantly run to the N.E. From the Strait of Sangar, as far as the parallel of $36\frac{1}{2}^{\circ}$, we had daily a current, which carried us N.E. $\frac{1}{2}$ East, at the rate of 10 miles in the twenty-four hours. From the latitude of 36° to $35\frac{1}{2}^{\circ}$, being about 70 leagues from land, it bore towards the E.N.E., with a velocity of 2 miles an hour. From the parallel of $35\frac{1}{2}^{\circ}$ to $34\frac{1}{2}^{\circ}$ the current bore to N.E. $\frac{1}{4}$ N., $1\frac{1}{2}$ mile an hour; we were then 60 leagues from land. Traversing the islands lying to the South of the Gulf of Jedo, we felt a current bearing to S.W., with a velocity of nearly a mile an hour; but after having passed these islands some degrees to the West, we again met with the former current bearing to the N.E.

When we discovered the coast of Japan upon the parallel of 31° , and particularly the southern part of the Isle Sikokf, the current carried us to the N.E., $3\frac{1}{2}$ miles an hour. Captain Broughton ranged near the eastern

coast of Japan during the months of November and July. We see by his journal that he constantly felt a current which carried him to the N.E., at 2 miles an hour, with this difference, nevertheless, that during the month of November the current bore more toward the North, and in July more to the East, but always between these two directions. We can conclude from the foregoing, that the currents upon the eastern coast of Japan are subjected to fixed laws, at least during the months of July, September, and October, and that their strength and force depend on the distance where they are met with from the coast.

It would be easy to multiply evidence of its character, but we take the description given of it in Commodore Perry's account of his mission to Japan, by Captain Silas Bent, as derived from the investigations by the U.S. officers in 1854 (pp. 601—3).

It is an immense oceanic current on the East coast of Asia, which will be found on the adjoining chart as delineated from the observations made by the Expedition, and bears a striking analogy, in every essential point, to the Gulf Stream of the Atlantic.

The results of these observations show quite conclusively that the stream has its origin in the great equatorial current of the Pacific, from which it is separated by the South end of Formosa, about the latitude of 22° N., long. 122° E., whence it is deflected to the northward along the East coast of Formosa, until reaching the parallel of 60° North, when it bears off to the northward and eastward, washing the whole S.E. coast of Japan as far as the Straits of Sangar.

Near its origin the stream is contracted, and is usually confined between the islands of Formosa and Majico-sima, with a width of 100 miles, but to the northward of the latter it rapidly expands on its southern limit, and reaches the Lew Chew and Bonin groups, attaining a width to the northward of the latter of 500 miles.

The north-western edge of the stream is strongly marked by a sudden thermal change in the water, of from 10° to 20° , but the southern and eastern limit is less distinctly defined, there being a gradual thermal approximation of the air and water.

Along the borders of the stream where it chafes against the counter currents and torpid waters of the ocean; as also in its midst, where whirls and eddies are produced by islands and the inequalities in its bed, strong tide rips are encountered, often resembling heavy breakers on reefs or shoals. Its average velocity, between the South end of Formosa and the Straits of Sangar, was found to be from 35 to 40 miles per twenty-four hours. Yet, upon one occasion, off the Gulf of Yedo, its maximum strength is recorded as high as 80 miles per day.

To the northward of the parallel of 40° N. in long. 143° E. there is a cold counter current intervening between it and the South coast of Yesso, as

shown by a sudden thermal change in the water, of from 16° to 20° , which, it is believed, sets to the westward, through the Straits of Sangar, but the limited stay of the squadron in that vicinity, and the harassing prevalence of fogs, prevented such observations being made as to satisfactorily determine whether or not there was a predominant current flowing in either direction, or whether it was merely the ebb and flow of the tides through the straits. To the westward, however, of a line connecting the North end of Formosa, and the south-western extremity of Japan, a cold counter current was again found, which sets to the southward through the Formosa channel into the China Sea, and it does not, therefore, seem unreasonable to believe that a hyperborean current will be found in the Japan Sea, setting to the southward between the Japanese Islands and the main coast of Asia, fed by that on the South coast of Yesso, and supplying that one setting through the Formosa channel.

The Japanese are well aware of the existence of the Great Stream which washes the south-eastern shore of their empire, and have given it the name of Kuro-Siwo, or Black Stream, from its deep blue colour when compared with the neighbouring waters of the ocean.

It was also noticed by Captains Cook, Krusenstern, and other explorers, but no systematic series of observations, it is believed, has ever before been made upon it.

The average maximum temperature of the Kuro-Siwo is 86° , and the difference between its temperature and that of the ocean due to the latitude is about 12° . There is no counter current intervening between the Kuro-Siwo and the coast of Japan, to the southward of the Straits of Sangar, and nothing was found to manifest the existence of such a current as *under-running* that stream, and although the observations indicate strata of cool water, lying in the longitudinal direction of the Kuro-Siwo, yet their temperature varied but a few degrees from the main body of the stream, and was almost invariably superior to that of the atmosphere above them. The insular position of Japan, and the separation of the cold counter current from the Kuro-Siwo, allowing the latter to hug close along the south-eastern shores of the islands, have a modifying influence upon the climate of the empire, making it milder and more equable than in corresponding latitudes on the East coast of the United States. There is a floating sea-weed found in the Kuro-Siwo, similar in appearance to the *Fucus natans* of the Gulf Stream.

In the passage of the *Mississippi* from Simoda to the Sandwich Islands the thermometer showed a cold aqueous space between the meridians of 155° E. and 170° W. and the parallels of 30° and 35° N. which bears a general correspondence in the Pacific to the position of the Sargasso Sea in the Atlantic.

Thus far the definition of the Japanese current rests on positive evidence

of unexceptionable character, as far as regards the seasons in which they were made. But its effects may be traced to the northward and westward.

It reaches the coast of Kamchatka. The mildness of the climate about Awatska Bay is attributed to the warm (Japanese) current coming from the south-westward, and thus ameliorates the severity of the winter. The comparative freedom from ice of the bays and inlets is also another evidence of its influence. The universal fogs which prevail, too, in the vicinity of the islands in the western portion of the Sea of Behring, arising, as is most probable, from the difference of temperature between the air and water, also indicates the same fact, and is perhaps analogous to the same phenomenon on the banks of Newfoundland, arising from the Gulf Stream.

The destruction of a Japanese junk occurred near the South end of the Kamchatkan Peninsula in July, 1729. It was proceeding to the Port of Ohosaka in the South of Japan, and was drifted away by a violent storm to the N.E., and at last reached the place alluded to. This is also corroborative.

Another and similar circumstance of a Japanese junk which had drifted from its destination, and anchored, in December, 1832, at Oahu, Sandwich Islands. Although the currents in the vicinity of this group do not seem to be very well defined in their character, and we shall adduce one of an opposite nature, this circumstance must also be considered as an evidence of the easterly drift from Japan.

But we may look still further to the East. A Japanese junk was wrecked near Cape Flattery, in Oregon, in 1833. This last is detailed by Washington Irving, in his "Astoria." These singular occurrences at once attest the tendency of the currents, and open a wide field for discussion on the migration of the inhabitants of eastern Asia and the peopling of the western world.

As an intermediate point where we may look for indirect evidence of the progress of this stream, the South extremity of Kodiak Island may be adduced. Here the remains of Japanese wrecks, recognised by the camphor-wood used in them, and other Japanese articles are found. We have no direct experiments recorded of the force or prevalence of the current to the South of the Aleutian Islands, but it may be supposed, from what has been said, to trend to the eastward towards the coast of N.W. America, and then assume a more southerly direction. This theory is confirmed by the ensuing remarks of Commander Wilkes, of the United States' Exploring Expedition:—Our passage from the Hawaiian group to the N.W. coast gave interesting results in relation to the currents. They were irregular until we reached the latitude of 27° N., after which we were strongly affected by a south-east current, whose influence continued until we reached the coast of Oregon. At this time it ran at the rate of 50 miles in twenty-four hours; but when the *Peacock* traversed this same space, ninety days later,

North Pacific.

3 P

the velocity had not only diminished, but what current was found was nearly in an opposite direction. In relation to the extent of this S.E. current in the months of March and April, I have no precise information, nor can I supply it from others, since those who had previously visited this part of the ocean had not paid sufficient attention to this subject to furnish any precise data. All, however, agree in the fact, that they were affected by a S.E. current, often reaching the longitude of 130° W. and the latitude of 35° N.

We may conclude our remarks on this part of the ocean with the observations of Admiral Lütke, whose scientific character and ample means command all confidence ;—

In the same way that the constant West current within the limit of the N.E. trade-winds is explained by the constant easterly winds, so beyond this limit we met with such currents as the prevalent wind would afford an explanation. We met with but one exception to this rule. In the three traverses to the South of Kamchatka and back again, between lat. 30° and 40° to 45° , and long. 162° and 146° , we found, even with easterly winds, currents to the East. In our route from the Bonin-sima Islands to Kamchatka, in May, 1828, we felt the first effect of this current, in lat. $33^{\circ} 42'$, where in two days it carried us 74 miles to the N.E., in calms and extremely light S.E. winds. From thence, in lat. 45° , we had for ten days, with only two exceptions, always currents to the East, although during all this time the wind was between S.E. and N.E., and that they blew sometimes very freshly. The mean action in this interval was 15 miles in twenty-four hours to N. 47° E. The current after that bore even more to S.E., but then during fresh winds from N.W. In the route from Kamchatka to Ualan, in October and November, we found the first S.E. current in lat. 38° during S.E. winds; the currents towards the East quarter kept up for eight days, the strongest occurred this time too in about lat. 34° , when we were drifted, in twenty-four hours, 35 miles N. 5° E., the wind nearly calm. Its mean action in these eight days was 8.6 miles in twenty-four hours, to the E.S.E. We found it in the same manner, and a year later, in lat. 40° , during a strong S.E. wind, or S.E. current. It was not then so marked, but as far as lat. 31° its general direction was towards the N.E. quarter, and afterwards, in lat. $27\frac{1}{2}^{\circ}$, we again found the S.E. current, two consecutive days, of 10 miles in twenty-four hours, with the weather nearly calm, or extremely light East winds.

Capt. Beechey found the same during three days in about lat. 35° N., long. 166° E.; the currents then from 40 miles to the S.E. to 6 miles to the South, and 19 miles to S.E. by S.

These currents have a remarkable analogy with those which have been observed in the same latitude on the coast of Japan, where strong E. and N.E. currents predominate. In comparing these phenomena with each

other, the conviction cannot be avoided that some connexion exists between them.

This is the only current in the northern part of the Pacific Ocean in which any sort of constancy has been observed independent of the prevalent winds, with the exception of this, we usually found that the currents followed the prevailing wind. To the North of this parallel of 42° , in the western part of the sea, we chanced to have the wind almost always from the East, and with it currents to the West, which, during fresh breezes, were sometimes of 20 miles per day, and when it fell calm they ceased entirely. In some cases, on the contrary, when the winds passed to N.W., the current then turned to S.E.; the immediate influence of the wind was here evident. The same may be affirmed for the space comprised between the parallels of 30° and 32° and the limits of the N.E. trade-wind, although we have met with some exceptions. In our route from the Caroline archipelago to the Bonin-sima Islands we lost the trade-wind in lat. 22° , and thence to lat. 27° we had constantly currents to the North, which corresponded more with the direction of the wind than with its strength, they being sometimes very strong with very light airs. Their mean action in the interval of six days was 15.3 miles in twenty-four hours, to N. 9° E. To the North of the Bonin-sima Islands until we got into the N.E. current above described, we had westerly currents of the mean rate of 12 miles in twenty-four hours, with the winds fresh from East. Further to the eastward, on the corresponding parallels, the currents were also to S.W., with westerly winds.

In the eastern part of the ocean, on our route to the N.W. part of America, the easterly winds accompanied us from lat. 30° to lat. 45° , with such constancy that we could not observe any change from the trade to the variable winds. Further on, until we reached within sight of the land, the East winds still continued, but they were neither so fresh nor so steady as before. During the whole of this time the current was sometimes N.W., at others S.W., varying in strength from 5 to 15 miles, its mean velocity in the space of fifteen days being 8.6 miles per day to S. 87° W.

On leaving the N.W. coast of America we likewise experienced a S.W. current, but then it was more decided. In the first four days, up to lat. 54° , long. 142° , it carried us to S.S.W. at the rate of 10 miles per day, even with winds from the West; it was only arrested once by a very strong wind from S.W. Further on, on our route to Ounalashka, during which contrary winds obliged us to bear to the South, as far as lat. $48\frac{1}{2}^{\circ}$, we did not have, in the course of eleven days, up to lat. 52° , long. 160° , any sort of current; thence to Ounalashka there was a weak current between N.W. and S.W. Its mean drift in twenty-four hours was, in four days, 6 miles S. 76° W.

The currents experienced by us do not at all correspond with those observed by the Russian colonial marine, who found the motion of the water, driven by the almost continual West and S.W. winds, in general follows the

direction of the coasts, in running to the North as far as Cook's Inlet, or Kenaiskoi Bay, and from thence to the S.W. Between the N.W. coast of America and the meridian of Kodiak the latitude observed is always greater than that by the reckoning, and quite the contrary further towards Ounashka. Articles that have been dropped or been thrown overboard from vessels at 100 miles to the S.W. of Sitka have been found in Prince William's Sound, or Tchougatskoi Bay; this shows also that the currents run to the North or N.E., and from this arises the great quantity of debris, of every description, thrown on shore in the neighbourhood of this bay. The current to the S.W. and S.S.W. along the Strait of Chelekhoff and the South coast of Alaska, as well as to the South coast of Kodiak, is confirmed by the inhabitants of this latter island, who search for and always find the wounded whales that have been abandoned, in the direction of Oukamok Island, where they are carried by the drift of the current. The strength of the southerly current, at 150 miles to the South of Kodiak, has been sometimes found to be 60 miles in twenty-four hours. This southerly current is sometimes met with at 3° to the East of the meridian of Kodiak, and extends to the passages between the Aleutian Islands, in which there are also periodic currents to the North, stronger than the opposing currents to the South. It is remarked, in general, that in spring and autumn the current is more strong and constant than in the other seasons; this perhaps explains why we did not find them in the order described.—(*Voyage du S^{én}iauvine.*)

In addition to the foregoing there will be found, on pages 687-8 *ante*, some further remarks on the great Japan Stream, which include the brief notes on its progress into the Japan Sea by Capt. Chas. Bullock, R.N.

SEA OF JAPAN.

There exists at present but little information regarding the navigation of the Sea of Japan. The winds there appear very available, and the currents, depending on special causes, are at times insignificant, whilst at others they run with great strength. The only thing known with certainty is, that the Japan Stream, as a rule (although with many variations of velocity, direction, and breadth, and much influenced by the wind), holds its way north-eastward from Korea Strait, and enters the Pacific by the Strait of Tsugar; also that a stream is usually found in the autumn months setting to the E.S.E. through La Pérouse Strait; and in the summer along the coast of Manchuria to the S.W.

There seems to be no regularity in the currents along the western coast of this sea; they are in general very feeble, increasing only off the abrupt points of the coast. Broughton, who in October, 1797 passed close along this coast, notices a current setting to the S.S.W. at the rate of 1 mile an hour. The French frigate *Virginie*, in July, 1856, found weak currents setting to the northward at a mean rate of 10 miles in twenty-four hours.

SEA OF OKHOTSK.

The direction of the currents in this sea is uncertain; they are found to increase in strength as the land is approached.

Near Cape Elizabeth, and on approaching the Gulf of Amúr, heavy overfalls and ripples occur, which appear to be produced by shallow surface currents, and they often render a vessel quite unmanageable. On some occasions, in a steady 5-knot breeze, vessels have been for hours with their head in the wrong direction, unable to answer the helm or trim of sails. A strong surface current here may naturally be expected, as the immense body of water from the Amúr, meeting with the obstruction caused by Saghalin Island, effects its escape by the largest outlet, rushing over the shallow banks at the mouth of the river, and continuing its course, following the line of coast round Cape Elizabeth, causes, especially with East and S.E. winds, a dangerous race, extending off shore 3 or 4 miles, and setting strong to the southward along the eastern coast of Saghalin, where, for some distance, the sea is discoloured by it.

SEA OF BEHRING.

A portion of the Japanese current and the general drift induced by the prevailing S.W. winds enters the Sea of Behring from the S.S.W., and exerts considerably influence on the climates of the respective shores. But in a nautical sense they are unimportant, and may be dismissed with the following extract from Mr. Simpson's remarks, drawn up while in H.M.S. *Plover* in 1852:—

In the absence of actual observations for determining the currents in these seas, the proofs of the existence of such a one as that described are collected from other circumstances, the chief of which are as follow:—

In the beginning of summer the eastern side, South of the strait, is free from ice, and Norton Bay itself is usually cleared as early as April. After the middle of June not a particle of ice is to be seen between Point Spencer and King Island, whilst the comparatively still water North of St. Lawrence Island is hampered with large floes until late in July. This can be satisfactorily accounted for by the existence of a northerly current of warmer water, partly driving and partly thawing the ice from the American shores.

There is scarcely a particle of driftwood to be had on the Asiatic coast from Kamchatka to East Cape, whilst abundance is to be found in Port Clarence and Kotzebue Sound, as well as along the whole of the American shore from Norton Bay to Point Barrow. Although it has been found that pine trees sixty inches in girth grow here, on the banks of American rivers, within the 67th parallel of latitude, yet from the frequently larger size of the trunks and their great abundance, it is evident these northern

regions, including Norton Bay, cannot supply the quantity; and more southern rivers, whether Asiatic or American, or both, must be looked to for the immense multitude of water-worn stems and roots strewed almost everywhere along the beach. Their southern origin would also seem to be indicated by the presence in many of them of the remains of the *teredo navalis*, which could hardly retain life throughout the rigour of eight or nine months' frost every year. Capt. Wellesley mentions having picked up on the North side of the entrance to Port Clarence, a buoy which had been previously lost from the anchor of the *Dadalus* off the Island of St. Lawrence.

N.W. COAST OF AMERICA.

The great extra tropical drift has been traced in its eastern progress, from the imperfect data at our command, in the previous page. Along the coast of Alaska we have but few observations to guide us to a conclusion. But by analogy it may be certainly inferred that a southern set is more or less constant, and, like the currents on the coast of Europe, the warmer waters are driven on to this coast, and so cause all the peculiarities of water and land climates alluded to on page 447. The sea abounds with animal life to an enormous extent. It is the greatest fishery in the world, while the S.W. winds blowing on to the coast over the water warmer than is due to the latitude of the coasts, deposits on the land the accumulated evaporation, and causes the climate of Alaska to be among the wettest in the world.

COAST OF CALIFORNIA.

The drift we have been tracing, in a reverse direction to the geographical arrangement of this work, assumes a more decided character along the coast of California, and is here much colder than the corresponding latitude, so that the harbours, such as San Francisco, are frequently enveloped in fogs. It follows the general trend of the coast, and may be 300 miles broad in the more marked portions of its course, but this is very indefinite. Under the shelter of its projecting headlands, and frequently close in-shore, there are counter currents, and reversed tides, by which small vessels can advantageously work their way against its general influence.

On approaching the southern parts of California, and in the latitudes of the peninsula it assumes a more westerly course, and is gradually merged in the great equatorial drift first described.

WEST COAST OF MEXICO.

The currents on this debateable ground are very difficult of definition. The navigation of sailing vessels is frequently very difficult and tedious,

owing to the embarrassment of calms and varying drifts, but there is no doubt they fluctuate with the shifting monsoons which prevail here. Cape Corrientes in lat. $20^{\circ} 25'$, that is fairly within the tropic, and which is subject to the varying streams which give it the name, is probably the northern limit of these shifting streams, and between that and Cocos Island, around which the streams are very devious, it may be considered that the general set will be to the southward in the winter months, and northward the rest of the year, but, as before stated, nothing very definite can be laid down.

The central portion of the North Pacific appears to be devoid of any currents dependent on any primary cause; and around this space the currents circulate in the order which has been described.

In the *Physikalischer Atlas*, by Professor Berghaus, a space in the eastern part of this area in the North Pacific is called *Fleurieu's Whirlpool*, as it is translated in the British edition of that work. This vortex is assumed from the reasoning by Fleurieu on the voyage of *La Solide* by Etienne Marchand. But independent of the not very satisfactory conclusions arrived at by the geographer, in the appendix to the second volume of that work, it may very fairly be questioned whether the reckoning of the vessel is entitled to such dependence as to found any characteristic of the currents as is attempted in the chart alluded to. It was stated in the outset that the estimation of currents was no easy problem, and that many causes concurred in the error of a ship's reckoning which have been unjustly attributed to the effects of currents. This argument will probably apply with some weight to the voyage in question.

There can be no doubt but this so-called vortex is but the eastern extremity of that central area of quiescent waters around which the eastern and western drifts of the Pacific basin circulate. There is one most remarkable evidence of this in the growth and abundance of animal life, aerial and marine, which everywhere is found. Sea-fowl of many species hover constantly over it; the waters are alive in some parts with mollusca and the fish which feed on them, and for many years it was one of the favourite whaling grounds of the Pacific fleet, their prey being attracted here by the abundance of food. In this respect it is precisely a repetition of the well-known Sargasso Sea in the Atlantic.

We have thus briefly and imperfectly drawn attention to the more marked features of the movements of the Pacific waters. They are, as has been said before, difficult to define, and so are of less nautical importance.

The notes by Commander Trollope, R.N., given in the Appendix to the Voyage of H.M.S. *Herald*, will be of great interest, as showing the uncertain nature of the currents in the S.E. part of the North Pacific.

4.—MAGNETIC VARIATION.

This important branch of seamanship is best elucidated in the one chief feature of the variation of the compass, by the illustrative diagram. To follow all the details of change in direction and intensity in the magnetic elements encountered in a long voyage would lead into a far larger discussion than would be compatible with the scope of this work.

But a due consideration of these essential features of magnetism is of the utmost importance to the safe conduct of a ship, as is well known, and the reader is referred to Mr. Towson's "Practical Information," or the "Admiralty Manual," for the necessary instructions in the management of his compass, whether uncorrected for local deviation or not, in the varied magnetic changes through which he will pass in the long voyage to the field of our present work.

The *isogonic lines*, or those upon which the variation is of the same amount, are given on the illustrative diagram, and are generally as accurate as the ordinary ship's compass will show it when at sea; at all events sufficiently exact for the purposes of navigation, and they will moreover serve to draw attention to any unsuspected change in the magnetism of the ship, should such change occur, and besides afford the sailor some information when observations cannot be had.

On this diagram is inserted the amount of annual change, or the *secular variation*, at present going on in different parts. The chart being adapted to the epoch of 1870, by multiplying the time elapsed between this date and any future year by the quantity of increase or decrease given, will give the present amount of variation for that time.

The arrangement of these isogonic lines are much more simple in the Pacific than over other oceans more subject to terrestrial interferences, and over the whole of the eastern portion they have a general East and West direction. On the western side, or the monsoon region, as it may be called, they run northwardly and southwardly. These features will receive due consideration from the mariner, but neither in its amount nor in its secular variation is there room for much remark.

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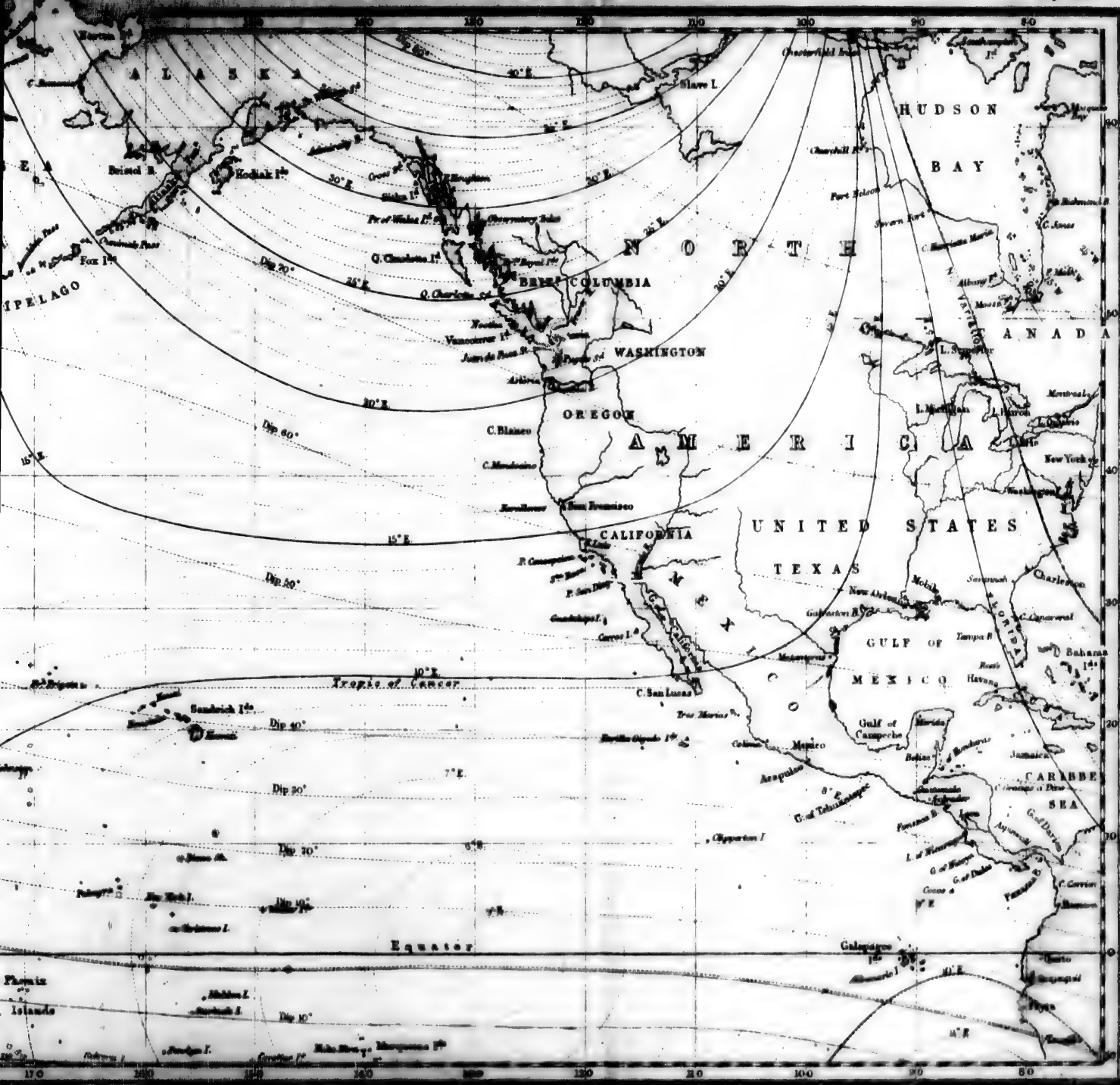
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THE NORTH PACIFIC OCEAN

Showing the
LINES OF EQUAL
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5.—PASSAGES.

From what has been said of the meteorology of the North Pacific it will be manifest that its navigation is simple and easy in every part, with the important exceptions of those places lying in the belt of calms, &c., especially the Bay of Panama. A voyage across the Pacific is carried on without difficulty, going eastward in the extra-tropical portion influenced by the anti-trade wind, and to the westward within the area of the N.E. trade-wind. This applies to the eastern portion of the ocean, and whatever variations from a direct course on the western side may be necessary, are due to the shifting monsoons of the China and other Asiatic coasts. These monsoons and their influences on navigation are described in our directory for the Indian Ocean, 1870, pp. 29 to 76, and in that for the Indian Archipelago, &c., pp. 1 to 32; and, as the countries most affected by them are described in those works, although they form the western boundary of the Pacific, the reader is referred to them for the necessary information.

One subject relating to over-sea navigation in such extensive oceans as the Pacific, great circle sailing, is very important, as it is under these circumstances that the greatest saving of distance is effected, by the choice of such routes or those approximating to the shortest distance in angular measurement. It will not be necessary further to allude to the subject here, as it has been dilated on in our volume on the South Pacific and in other works specially devoted to mathematical geography. Some of the great circle tracks are shown on the adjoining diagram, and these must suffice.

The following notes on the general tracks across the North Pacific are derived from various sources as quoted, and commence with those from the Atlantic around Cape Horn.

CAPE HORN TO CALIFORNIA AND BRITISH COLUMBIA.

As in the Atlantic Ocean, the route from South to North, or vice versâ, in the Pacific, by crossing the different belts of winds and calms, requires much consideration as to the best points for crossing the various parallels of latitude and the equator. The entering or leaving one zone at the most advantageous point has a very great influence on the speed and safety of the ship through the rest. Therefore this meridional voyage must be considered with reference to the countries beyond the scope of this work. What has been previously said on the winds and currents will be necessary to understand the requirements of this section.

To Captain Maury, and also to the Dutch Meteorological Institute, under Captains Janson and Van Gough, we owe very much for their lucid discussions and long series of examples from which a correct decision may be arrived

at. We therefore quote the words of the former, but omit the tables upon which the conclusions are based. They are very interesting, but to insert them would unduly enlarge this work.

The California bound vessels should aim to enter the S.E. trade-wind region of the Pacific as far to the West, provided they keep on the eastern side say of 118° W., as they well can; they should not fight with head winds to make westing, nor should they turn much from the direct course when the winds are fair. But when winds are dead ahead, stand off to the westward, especially if you be South of the trade-wind region. Having crossed the parallel of 35° S., and taken the trades, the navigator, with the wind quartering and all sails drawing, should now make the best of his way to the equator, aiming to cross it between 105° and 120° , according to the season of the year, and the directions hereinafter given.

I wish here to call the attention of navigators to the winds they are to expect between the parallel of 50° S., in the Pacific and the equator especially, as it regards their reliability.

The distance from the fairway of St. Roque (lat. 7° S.) to the parallel of 50° S., in the Atlantic, is about 2,900 miles, the average time 30 days, and the mean daily run is about 100 miles.

The distance from 50° S. in the Pacific to the usual crossing place on the line—California track—is about 3,300 miles, the average time 27.7 days, and the mean daily run 132 miles.

The winds between 50° S. and the equator are much more strong, steady, and reliable, as the barometer would lead us to expect, on the Pacific, than they are on the Atlantic side of the continent; the ratio between them in these respects is greater than 2,900 to 3,300, for it is easier to make 3,300 miles with them in the one ocean than it is 2,900 in the other.

An examination of the mean monthly passages from crossing to crossing will also show a greater regularity, implying thereby more stable winds. The greatest monthly average on the East side is 31.1 days in August; on the West 27.9 in May, extreme difference, 3.2 days; the greatest monthly average on the West side being 27.9 days; the least 22.2 days; the extreme difference is 5.7 days.

Between the equator and 10° or 12° N., according to the season of the year, the California bound navigator may expect to lose the S.E., and to get the N.E. trade-winds.

He will find these last nearer the equator in January, February, and March; but in July, August, and September, he will sometimes find himself to the N. of the parallel of 15° N. before he gets fairly into the N.E. trades. And sometimes, especially in summer and fall, he will not get them at all, unless he keeps well out to the West. Having them, he should steer a good rap full at least, aiming, of course, to cross the parallel of 20° N., in about 125° W., or rather not to the East of that, particularly from June to No-

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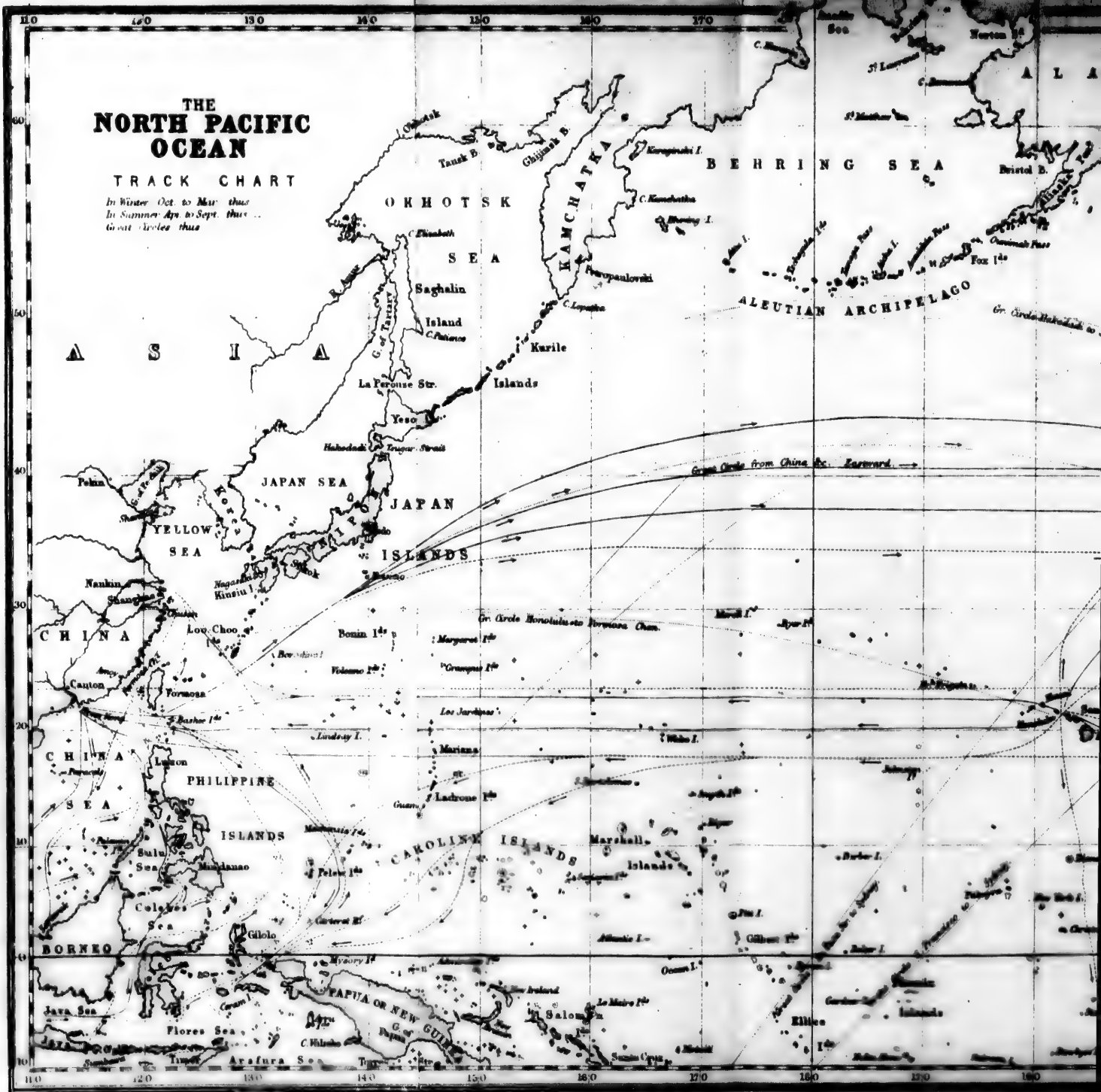
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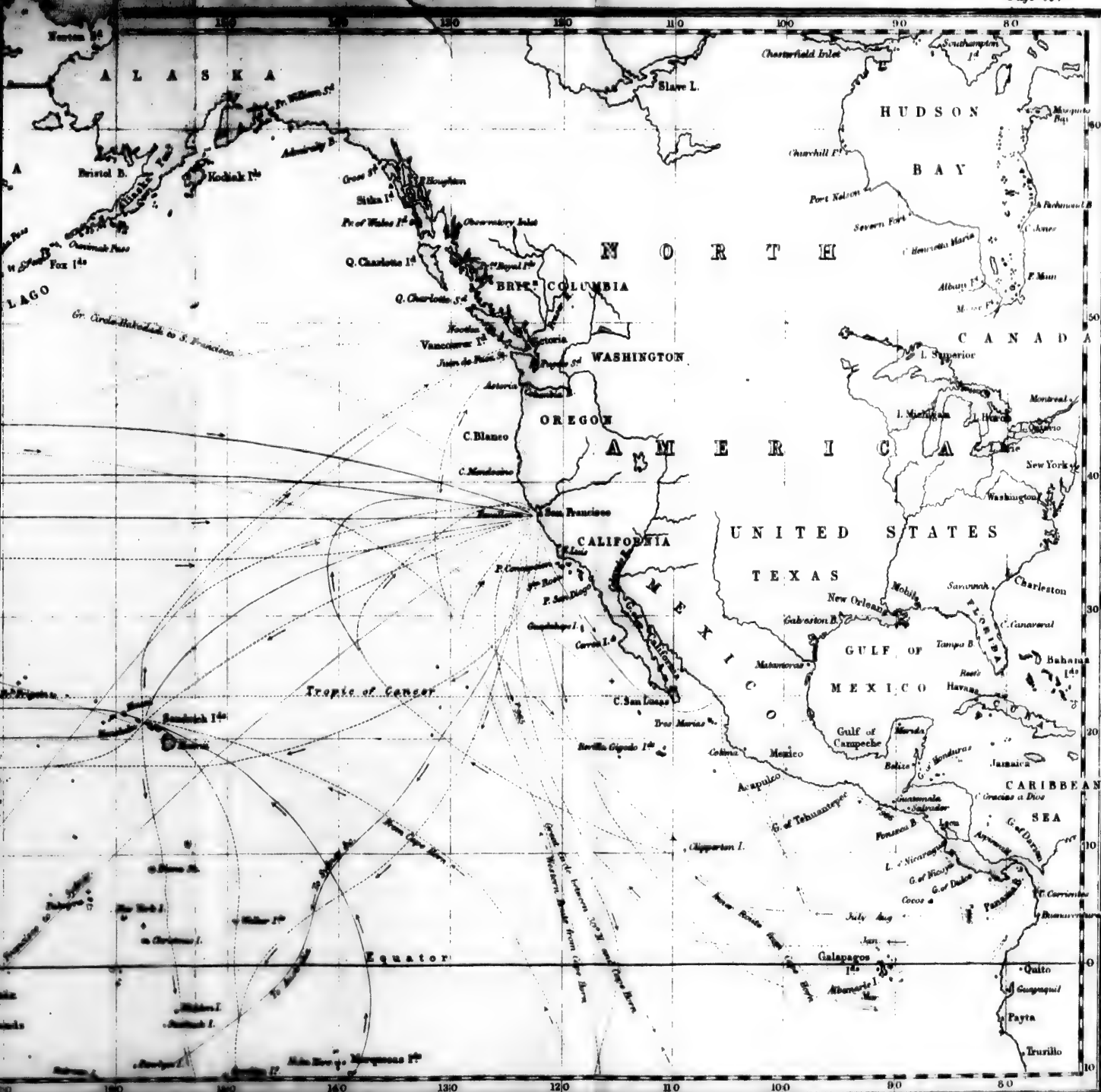
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THE NORTH PACIFIC OCEAN

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vember. His course, after crossing 20° N., is necessarily to the northward and westward, until he loses the N.E. trades. He should aim to reach the latitude of his port without going to the W. of 130° W., if he can help it, or without approaching nearer than 250 or 300 miles to the land, until he passes out of the belt of the N.E. trades, and gets into the variables, the prevailing direction of which is westerly.

"Where shall we take the S.E. and lose the N.E. trades on the passage to California?" is an important question for a navigator to have answered, who is striving for a short passage on the West coast of South America. From the parallel of Cape Horn up to the belt of light winds and calms, through which you generally pass before getting into the S.E. trades, the prevailing winds are westerly winds, having nothing more frequently than southing in them.

Between the N.W. coast and the meridian of 130° W., from 30° to 40° N., the prevailing direction of the wind in summer and fall is from the northward and westward, whereas, to the West of 130° , and between the same parallels, the N.E. trades are the prevailing winds of these two seasons. There is a marked difference in the direction of the winds on the opposite sides of the meridian of 130° W. in the North Pacific. The cause of this difference has been completely unmasked by the researches connected with these charts. The agent which produces it has its seat in the arid plains of New Mexico, Northern Texas, and the regions round about. At this season of the year the prevailing winds in the western part of the Gulf of Mexico are from the southward and eastward; that is, towards the great centre of rarefaction. At this season of the year, too, the prevailing winds in the Pacific, off the coasts of Central America, are from the southward, and also towards the same centre of heated plains and ascending columns of air; and we have seen that off the coasts of California, between the parallels of 35° and 40° N., the prevailing winds of this season are from the northward and westward; also towards this great inland "blow hole." In it is seated a monsoon agent, whose influence is felt for more than a thousand miles out to sea, drawing back the N.E. trades of the Pacific, and converting them into a southwardly monsoon for half a year; deflecting the N.E. trades of the Gulf of Mexico, and converting them into a south-easterly monsoon during the same season, and so influencing the prevailing S.W. winds off our N.W. Pacific coast that they, too, are almost made to blow a north-westerly monsoon.

Therefore vessels bound to San Francisco should not unless forced by adverse winds, go any further beyond the meridian of 138° W. than they can help. Supposing that vessels generally will be able to reach 30° N. without crossing the meridian of 130° W., the distance per great circle from Cape Horn to its point of intersection with that parallel is about 6,000 miles.

And supposing, moreover, that California bound vessels will generally, after doubling Cape Horn, be able to cross the parallel of 50° S., between the meridians of 80° and 100° W., their shortest distance in miles thence to 30° N., at its intersection with the meridian of 130° W. would be to cross 40° S. in about 100° W.; 30° S. in about 104° ; 20° S. in about 109° ; the equator in about 117° W.; and 30° N. in about 130° W. (126° if you can). By crossing the line 10° further to the East, or 10° further to the West of 117° , the great circle distance from Cape Horn to the intersection of 30° N. with 130° W., will be increased only about 150 miles.

Navigators appear to think that the turning point on a California voyage is the place of crossing the equator in the Pacific. But the crossing which may give the shortest run thence to California may not be the crossing which it is most easy to make from the United States or Europe; and it is my wish to give in these sailing directions the routes which, on the average, will afford the shortest passage to vessels that have doubled Cape Horn; and then, by comparing the two, we may be able to lay down the best route from Cape Horn to California.

There are 87 crossings between 115° and 120° W., which have been analysed. They give the shortest average time to San Francisco; their average, however, is only 16 hours (0.6 day) less than the average from the crossing between 110° and 115° , and the average to the latter crossing from 50° S. is 8 hours (0.3 day) shorter than the average to the former crossing. Hence we conclude from a total of 441 passages from the line, of 448 to the line, that the average passage from 50° S. to San Francisco is 53.5 days via the crossing between 115° and 120° W., and 53.8 days via the crossing between 110° and 115° . Thus, in the long run, the crossing between 115° and 120° gives the best average, but is not so much frequented as that between 110° and 115° , the numbers being respectively 103 and 220.

A long series of tables derived from the voyages quoted is given by Capt. Maury in elucidation of the subject, which are very interesting. We give some of his concluding remarks on the discussion of these tables.

The shortest monthly means are 104 and 116 days, and these are for the vessels that crossed the equator in the Pacific during the months of January and December. And to this crossing they had an average run of 96 and 98 days. Vessels that sail from the United States to California in all of September and October are the vessels which, upon an average, should have the fairest winds and make the best passages.

It is of some consequence, in deciding as to the best crossing place on the equator, that the navigator should have an idea as to the parallels near which he may expect to lose the S.E. trades; for the equatorial limits of these winds change with the season.

In March you will occasionally carry them several degrees over into the northern hemisphere. But in this month they are generally near the verge

of their extreme declination towards the South. When you lose them and get the N.E. trades, keep away with a good rap full, never aiming to cross the parallel of 20° North to the East of long. 125° West. Unless the winds force you off, aim to be in shore of the meridian of 130° W. when you lose the N.E. trades.

When you do lose them, if then you have to fight the calms and baffling winds of the horse latitudes, make the best of your way on a due North course, till you cross this belt of calms, or catch a good wind, or get into the variables beyond. I shall have more to say upon this subject at some other time.

In April you will carry these trades a little further North, and so on further and further until October, when the northern edge of them becomes stationary and commences to return South. It reaches its furthest parallel of southern declination in March or April.

It appears from the summing up that the average passage to California for all classes of ships that used the charts and crossed the equator between 105° and 120° is, the year round, 130 days. When these investigations commenced, the average passage the year round of all classes of ships, from the Atlantic ports of the United States to California was 180 days.

Indeed, it may now be considered as reduced to 128 days, for that is the average of the 87 vessels that crossed between the meridians of 115° and 120° West, which these investigations have shown to be the best crossing place. Indeed, the average of the 220 vessels that have crossed between 110° and 115° W., taken with the 87 that have crossed between 115° and 120° , makes the average rather less than 129 days.

The average passage of upwards of 300 vessels that have crossed between 110° and 120° is 128.9 days. There is no reason why all vessels should not cross the equator between these two meridians, and hence we may consider it as an established fact, that the average length of the sailing voyage from Europe or the Atlantic ports of the United States is less than 130 days.

The vessels that sail in the spring have, in the aggregate, an average passage ten days longer than those which sail at other seasons, the spring average being 137 against 127 days for the rest of the year.

The average crossing place of 50° S. on the Pacific is about 82° West. Winds are sometimes, though not often, fair for making westing on the polar side of 50° S. When they are so, the skilful navigator will not fail to take advantage of them to gain a still more westerly crossing of this parallel.

In urging upon California bound vessels the importance of making westing about the parallel of 50° S., I do not mean that they should expose themselves to heavy weather, or contend against adverse circumstances. I simply mean that if a vessel, after doubling the Cape, can steer a W.N.W. course as well as a N.W., or a N.W. as well as a N.N.W., or a N.N.W. as well as

a N. course, that she should on all such occasions give preference to the course that has most westing in it, provided that she does not cross 50° S. to the W. of 100° or thereabouts, nor 30° S. to the westward of 115° , nor enter the S.E. trade-wind region to the West of the last-named meridian. This is the western route. It is so called because it requires you to keep as far West, within certain limits, as you well may without running broad off to make westing, or without fighting with head winds, or baffling winds, or calms to get West.

The western route from Cape Horn to California is, as a route, to be preferred by all vessels at all seasons.

The further from the land, the more regular and steady the wind, may be safely taken as a general rule.

Captain Sherard Osborn, R.N., says:—Supposing a vessel bound to the western coast of Mexico, and running before the southerly gale, which almost constantly blows along the shores of South America, she ought to shape a course so as to cross the equator in about 98° or 99° West longitude so that, when she gets the N.E. trade, she will be at least 6° or 7° to the eastward of her port—San Blas or Mazatlan, and have, at the same time, a sufficient offing from the Galapagos Islands to avoid their currents and variable winds.

We crossed in long. 105° W., having been recommended to do so by some old merchants at Valparaiso, and were consequently, although a remarkably fast-sailing ship, a lamentably long time in making the distance. Several days' log of the ship shows as follows:—March 24th, 1848, San Blas, 672 miles distant; 25th, 646 miles distant; 26th, 657 miles distant. Our track led us to be exactly in the same longitude as our port; when we got the trade, and it hanging well to the northward, we were constantly increasing our distance until in the latitude of San Blas, when an in-shore tack of course shortened it. But by the course I have recommended, the first of the N.E. trades will drive the vessel into the meridian of her port, and she will thus daily decrease her distance.

Care must be taken when standing in for the land not to go to leeward of San Blas, as there is a strong southerly current along the coast, especially off Cape Corrientes.

A vessel making the passages northward from San Blas had better make an inshore tack, until she reaches the latitude of, or sights Cape San Lucas, as she will there get the true wind, which blows almost without intermission along the line of coast from the northward. A West, or may be *South* of West course, will only be first made good, but as the offing is obtained, the wind will be found to veer a little to the eastward. However, it will always be the object to make headway, and get out of the tropic without any reference to the longitude, as a strong N.W. wind will soon, in lat. 25° or 28° , run off the distance, provided you have sufficient nothing.

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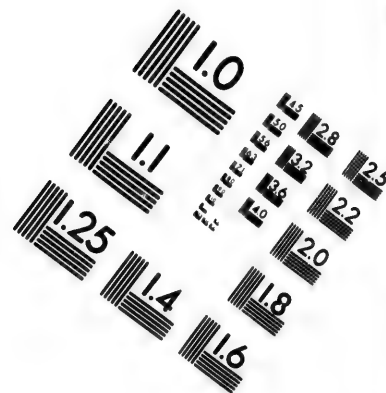
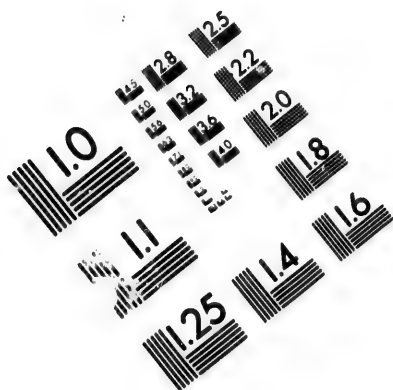
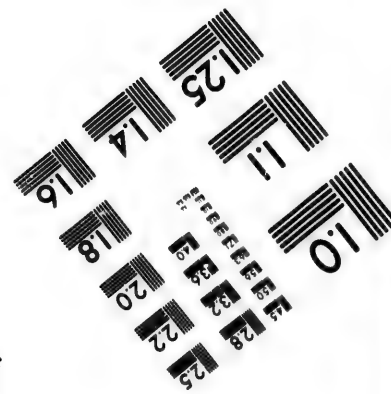
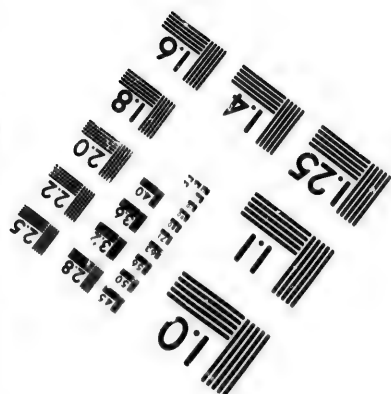
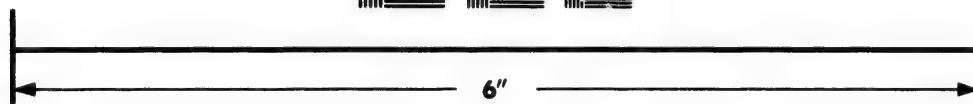
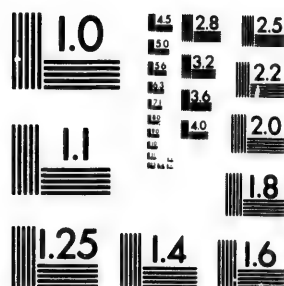


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The attempt to beat up in-shore amounts to perfect folly, if it does not deserve a worse name, a strong current accompanying the wind; and the latter must be taken into consideration, when running in for your port with westerly winds.

Should a vessel be bound to California direct, I would cross the equator in the Pacific Ocean in about long. 100° W.; cross the N.E. trade with a topmast studding-sail set, and thus pass into the limit of the westerly winds, about 300 miles to windward of the Sandwich Islands; and once on them, take good care to keep to the northward of my port, for, as you approach the shore, the wind will draw round North, and the current to the southward increase.

These remarks, and the illustrative map of the passages will serve to elucidate these routes.

BETWEEN CALIFORNIA AND AUSTRALIA, ETC.

Captain Maury says:—The great circle distance from South Australia to California is about 7,000 miles, and vessels in the direct trade between Australia and the Pacific coasts may have the choice of routes going as well as coming; going, the distance to be sailed, on account of detour for the sake of winds, is about 7,500 miles; returning, that is, coming this way by the eastern route, the distance is eight or nine hundred miles greater. With the exception of the N.E. trades on the passage from New South Wales or Victoria to California, the winds are fair, or may conveniently be made fair both ways. A good N.E. course can be made through the S.E. trades, and a N.N.W. course, on the average, through the N.E. trades. But these courses will not give easting enough for the California bound trader, and it therefore becomes a question for him to decide whether he will make up his easting in the variables South of S.E. trades, or in the variables North of the N.E. trades, for in both of those systems of variables westerly winds prevail.

If you pass through Cook's Straits, then stick her close to the eastward, and take the eastern passage. On this passage you should run down your easting pretty well before you get far enough to be bothered by the baffling winds of the horse latitudes South. If these come as low down as 30° or 40° S., stand N. the moment you feel them till you get the S.E. trades; then cross these and the N.E. trades, both as obliquely to the eastward as they will permit, with fore-topmast studding sail set.

On this passage you will have finally to run down your easting when you get into the variables beyond the N.E. trade, and of course you will aim to reach the parallel of 38° or 40° N., or even a higher one North, to do this. How far you will go North depends somewhat on the distance, you may be West of California when you lose the N.E. trades. If you be only a degree

or two from the land, you will steer straight to your port without caring to get to the northward of it; but if you be ten or twenty degrees to the West of it, or even further, then of course the distance to be run makes it an object to turn out of your way and go North in search of good winds.

Therefore, the choice of routes on this voyage resolves itself into the answer to this question: Is it best to making easting between the parallels of 40° or 50° S., or about the parallel of 40° N.? If the former, then the eastern route is the route; if the latter, then the preference should be given to the western route.

I give preference to the eastern route, especially and decidedly when the winds at starting are favourable for the East course. I have no doubt but that, as a general rule, the winds by the eastern route, both variables and S.E. trades are much more steady and reliable than they are by the western route. Moreover, the distance from the Victoria Ports, via South side of Van Diemen's Land and New Zealand, is not more than three or four hundred miles greater than it is by the most direct route that is practicable, and the chances of good winds by the eastern route will, in my opinion, amply make up for this increased distance.

It is proper for me to state here that I do not give these Australian sailing directions as directions that are founded on or derived from investigations into the routes actually pursued by vessels from Australia to California; but I give them as deductions drawn from the knowledge which I have acquired touching the general system of the winds and currents out upon the high seas.

The most difficult and uncertain parts of this passage will be in the time required to cross the three belts of calms, and to clear the winter fogs of California. But for these the eastern passage from Victoria to California would be one of the most certain passages in the world.

The distance from Victoria to California cannot be accomplished under canvas, by the eastern route, much short of 8,700 miles. But driving captains, with clipper ships under them, may expect to average, one trip with another, along this route, not far from 200 miles per day. The clipper rate from Victoria to Cape Horn will probably be upwards of 200 miles a day; for I feel assured that there is no part of the ocean in which the winds generally will admit of more heavy dragging and constant driving than they will in the extra-tropical regions generally of the South Pacific, say on the polar side of 43° S.

Returning from California to Australia, the route out of San Francisco should be down as soon as possible into the N.E. trades, as though you were bound to China, India, or the Sandwich Islands, crossing the equator anywhere between the meridians of 140° and 150° W., according as you prefer to run down your westing principally in the N.E. or S.E. trades. I give the preference to the latter generally, because they are more steady, reliable, and

certain, than are their congeners of the northern hemisphere—at least, such is the rule. The distance by this route to Bass Straits will be about 7,500 miles; and an increase upon this of the average distance to be sailed on the passage going, together with the distance returning, will not amount, as before stated, to more than six or eight hundred miles.

Aim to cross 30° S., on the passage from California to Australia, in the neighbourhood of 170° E.

Thence the course is between Australia and New Zealand, direct for your port.

The passage between Australia and California should be made ordinarily in from 45 to 50 days; the passage to the East being rather the shorter, of course clipper ships will occasionally make the passage in 37 days.

PANAMA TO CALIFORNIA.

Captain Maury, to whom we are still indebted, referring to the data he had collected, says:—

After carefully studying this description of the wind, derived, it is true, from no great abundance of materials, I have to suggest the following routes for the consideration of navigators bound N.W. from Panama.

From the Bay of Panama make the best of your way South until you get between 5° N. and the equator.

Being between these two parallels, it will be for the navigator to decide whether he will shape his course West, and keep between them until he crosses the meridian of 25° West, or whether he will cross the equator, and make his westing in South latitude, with the S.E. trades on his quarter. The winds that he finds between 5° and the line should decide this question for him. If he can get West here with a good breeze he should crack on, and when his good wind leaves him, steer South again.

If the passage from Panama be attempted in January, February, March, April, May, or June, time will probably be saved by going South of the equator; for, at this half of the year, the N.E. trades and the equatorial doldrums are often found between the equator and 5° N. Between the meridians of 80° and 85° West, in this part of the ocean, these winds and calms are found even in the months of July and August. Therefore, in coming out of Panama, and after crossing 5° N., in any season, make a S.W. course if the winds will allow. If the wind be S.W., brace up on the starboard tack; but if it be S.S.W., stand West, if it be a good working breeze. But if it be light and baffling, with rain, know that you are in the doldrums, and the quickest way to clear them is by making all you can on a due South course.

Suppose that after crossing 5° N. you have got to the West of 85° without
North Pacific.

having crossed the equator. Now, if the time of the year be in that half which embraces July and December, the prevailing winds will be between S.E. and South, inclusive, and the course is West as long as there is a breeze. As soon as the breeze dies away, and you begin to fight the baffling airs, conclude that you are in the vicinity of the doldrums that are often found here either between the N.E. and S.E. trades, or between one of these trades and the system of southwardly monsoons that blow North of the line, and between the coast and the meridian of 95° W.

These belts of doldrums lie East and West, and the shortest way to cross them is by a due North and South line; therefore let it be a rule, whenever the navigator finds himself in one of these calm belts, to make all the latitude possible, for by that means he will soonest clear it.

Having crossed the meridian of 95° , stand away to the northward and westward with a free wind.

West of longitude 100° , and between the parallels of 5° and 10° N., the winds, in the months of November and December, are variable between N.E. and South, by way of East. In January, February, and March, they are quite steady as N.E. trades. In April they are variable. The doldrums are generally found between those parallels in this month. During the rest of the year the winds are all the time between S.E. and S.W.

It will be well to cross the parallel of 10° N. at least as far West as the meridians of 105° or 110° W. Here, between the parallels 5° and 10° N., the winds in November are steady from S.S.E. and South; December, April, and May, are the months for the doldrums in this part of the ocean.

Having crossed the parallel of 10° N., between 105° and 110° , the navigator is then in the fair way to California.

In making the West coasts of Mexico and the United States, the kelp is said to form an excellent landmark. This weed is very long and grows on the rocks at the bottom. When, therefore, in approaching the coast, you come across lines or swaths of tangled kelp, its being tangled or matted is a sign that it is adrift. It is afloat in deep water, and you may sail boldly through it without fear. But when you come across it tailing out straight, it is then fast to the rocks at the bottom, and it is dangerous to get among it.

Vessels out of San Francisco intending to touch at Panama or any of the ports South should stand out well from the Mexican coast. Information as to the best route for these passages is wanting. But I should, with such information as I at present have with regard to this navigation, feel disposed, were I bound from San Francisco to Panama, to steer straight for the line somewhere about 104° W, and stand on South until I could, with the S.E. trades, run in on the starboard tack for the land.

In addition to this may be quoted a letter to Captain Maury from Captain Bloomfield, a gentleman of twenty-five years' experience on that coast:—

"Your own experience will have shown you that from December to April are the summer months or dry season; the northerly wind prevailing more or less during the major part of the time, it being the strongest about January and February, gradually taking off until about the middle of April, when the winter months are supposed to commence, from May to August, when rains, thunder, and lightning, with nearly daily thunder squalls intervene, causing the winds to be as changeable during the twenty-four hours as often as there are hours in the day.

"From August to December the weather becomes somewhat settled, and commencing lightly with a southerly wind, in October and November, I have seen it blow a moderate gale home to Panama anchorage, inasmuch as to cause the merchant vessels to have two anchors down. The sea also becomes somewhat rough, requiring more than ordinary care in landing in boats. It is accompanied sometimes with squalls and intermissions, but, generally speaking, with cloudy but dry weather. I have at times experienced some very clear nights and days during this season.

"In leaving Panama it is easy to be done in either the summer, or when the northerly winds prevail, or from August to December, when you generally have a southerly wind, which will enable either to sail or work out of the bay.

"The starboard or western in-shore should be kept in board by a sailing vessel on leaving, and the eastern side inside the Pearl islands on entering, except you are entering about the months of September, October, and November, when in all probability you would bring a strong southerly wind; but during the prevalence of the northerly and light winds, the eastern passage is beyond doubt to be preferred.

"If bound South, in passing Point Mala within three or four miles, the greatest object is to get to the westward in 81° or $81^{\circ} 30'$, in order to avoid the strong current, rains, and light winds which prevail nearly all the seasons of the year to the eastward of it, about the environs of Buena Ventura. In passing Point Mala, either with a northerly or southerly wind, make your westing as soon as you can; and by getting into the longitude above named, it will enable you to reach the southerly winds sooner, either to enable you to make your westing up, if bound to the northward, to long. 110° to 114° W., or to work to the southward, taking advantage of every change, until the latitude of Plata is reached, when the shore can be approached to take advantage of the land winds, if taking the in-shore passage, or it will enable you to stand to the S.W. if taking the off-shore passage.

"In working to the southward, after leaving Point Mala with a southerly wind, do not be tempted, when on the starboard tack, to stand to the S.E. and S.S.E. too long, as the current about 140 miles to the South of Point Mala runs constantly to the eastward. On some occasions I have known it

set—in fact, I have been set—35 miles in 24 hours, ascertained by good chronometer, and confirmed by making the land. Therefore it is always advisable to hold on your westing, even if you should make nothing in doing so, and comparatively little difficulty will be attended in reaching the southerly winds, which ranges to different latitudes during the 12 months; as a rule—

“From April, to 1° North; from May, to 2° North; from June, to 3° North; from July, to 5° North; from August, to 6° North; from September, to 7° 30' North; from October, to Panama anchorage; from November, to 7° North; from December, to 5° North; from January, to 3° North; from February, to 2° North; from March, to 1° North.

“Therefore, after reaching the outer verge of the southerly wind, the next object, more particularly if bound to the westward, is to be certain that you entered it far enough, so as to reap the whole benefit of its strength, which you will find to be equally different in its position as the southerly wind is reaching its northern limit; but, generally speaking, when the northerly winds do not prevail from off Point Mala to its (southerly wind) limits, it prevails from S.W. to N.W.

Mr. Hull, R.N., of H.M.S. *Havannah*, says:—

“Lieutenant Maury truly says, ‘that the passage under canvas from Panama to California, as at present made, is one of the most tedious, uncertain and vexatious that is known to navigators.’

“The best way to avoid these difficulties seems to be by making southing on leaving Panama; do not care about making westing, but push South; at this time of the year (July and August) you will probably meet the S.E. trade well over the line in 4° or 5° North; then run to the westward till you reach the meridian of 110° W.; you may then cross over to the N.E. trade; keep well free. Ships generally make the best passages that have gone to the westward of 114°. On running in for the land, make Punta de los Reyes.

“These remarks are written partly from Lieutenant Maury, and partly from my own experience in these seas. In H.M.S. *Herald*, I made three passages, two from Panama and one from Port Burica, which is about 200 miles to the West; the first took us 32, the second 42, and the third 28 days; to get clear of the variables in the passages we pushed to the westward, keeping in about lat. 10° N. H.M.S. *Brisk* was 84 days from this port to San Francisco, and in 1849 and 1850 ships were commonly 80 days.

“On the other hand, H.M. brig *Swift*, by going to the southward, made the passage to Honolulu in 47 days, and one ship only made 45 days to California by adopting this plan.

“Again, the weather in the doldrums is most harassing—heavy rain, with

squalls, thunder, and lightning; whereas by going South you have the fine S.E. trades."

In a future paragraph some further remarks on the difficult navigation of the Gulf of Panama will be given.

CALIFORNIA, ETC., TO PERU.

Most vessels on this voyage make a mistake, especially in summer and fall, in the passage across the belt of N.E. trades. Being anxious to get to the East, they edge along, aiming to lose these winds in 90° or 100° , as the case may be. There they encounter the southwardly monsoons in the Pacific off the American coast as they are along the African coast in the Atlantic. The vessels taking that course, and being so baffled, have now to make a sharp elbow and run off 8° or 10° , or even more degrees to the westward before they clear this belt of calms and monsoons and get the S.E. trades. Of course the voyage is greatly prolonged by this.

The route which, as at present advised, I would recommend, is, that navigators steer the same course from California that they would if bound to the United States, until they pass through the S.E. trades, and clear the calms of Capricorn. Therefore I say to the Chincha-bound trader, when you get your offing from the heads, steer South, aiming to cross the line *not to the East* of 115° , for the rule is, the further East the harder it is to cross the equatorial doldrums in the Pacific as well as it is in the Atlantic.

When you get the S.E. trades crack on with topmast studding-sail set until you get the brave West winds on the polar side of the calms of Capricorn. Now turn sharp off from the route around Cape Horn, and run west until you bring your port to bear to the northward of N.E., when you may stick her away. Now, by this rule the Chincha-bound navigator may sometimes, before he gets these westerly winds, find himself as far South as 40° or 45° , and as far East as 120° or 125° . Let him not fear, but stand on until he gets the winds that will enable him to steer East, or until he intercepts the route from Australia to Callao, when he may, without fear of not fetching, take that.

In the summer and fall of the northern hemisphere (June to November) the calm belt of Capricorn will be cleared generally on the equatorial side of the parallel of 30° South; at the other seasons you will have frequently to go 6° or 8° further.

CENTRAL AMERICA, MEXICO, ETC.

Our information as to the best means of making a passage along these coasts is still but scanty. The following observations, therefore, by Lieutenant Commander James Wood, of H.M.S. *Pandora*, become exceedingly valuable.

In a former page we have given the observations of the prevalent winds in this region from the same officer.

From the Southward to Panama Bay.—From what has been said respecting the winds which prevail within the first division, it will be seen that the passage from the southward to Panama Bay is easily made during the greater part of the year; but in the fine season, when within the influence of the northers, the following plan should be adopted. Make short tacks in-shore, as there is generally a set to the northward found within a few miles of the land, and where that is interrupted, a regular tide is exchanged for a constantly contrary current further off. Between Chirambira point and Cape Corrientes the land is low and faced with shoals, caused by the mouths of the numerous rivers which have their outlets on this part of the coast, but after passing Cape Corrientes, it may be approached pretty closely, except off Francisco Solano point, where some shoal rocky patches extend to seaward, as the coast is in general bold-to. Care, however, should be taken not to run into the calms caused by the high lands, as it is difficult to get off into the breeze again, and the swell sets in-shore where it frequently happens that no anchorage is to be found till close to the rocks.

In beating up the Bay of Panama in the fine season, the eastern passage or that between the Islas del Rey and the main, is to be preferred, as, with one exception, it is free from dangers. The water is smooth, and a regular tide enables you to make more northing than it would be possible to do, in nine cases out of ten, against the strong current, and short high sea, which at this season prevail in the centre or on the western side. During the rainy season, a straight course up the bay is preferable to entangling yourself with the islands, the current generally following the direction of the wind.

From Panama Bay to the Southward.—But the great difficulty at all times consists in getting either to the southward or westward of Panama. The passage to the southward is made in two ways,—either by beating up the coast against a constantly foul wind and contrary current, or by standing off to sea till sufficient southing is made to allow you to fetch your port on the starboard tack. Both plans are very tedious, as it frequently takes twenty days to beat up to Guayaquil, whilst six or seven days are an average passage down.

From Panama Bay to the Westward.—If bound to the westward during the northers, a great deal of time may be saved by keeping close in-shore, and thus taking advantage of them; they will carry you as far as the Gulf of Nicoya. When past the Morro Hermosa, "Papagayos" may be looked for, and with them a course should be steered for the Gulf of Tehuantepec, when it will depend on the port you are bound to, whether, after crossing the gulf by the aid of one of its gales, you should keep in or off-shore. If bound for Acapulco, keep in and beat up; but if bound to the westward,

you cannot do better than make a West course, as nearly as the winds will allow you.

The passage to the westward from Panama during the rainy season is a most tedious affair, calms, squalls, contrary winds and currents, accompanied by a heavy swell and extreme heat, as well as an atmosphere loaded with moisture and rain, are the daily accompaniments. It often occurs that 20 miles of westing are not made in a week, and it is only by the industrious use of every squall and slant of wind that the passage can be made at all.* Opinions are divided amongst the coasters as to the propriety of working to the southward and trying to get rid of the bad weather, or beating up within a moderate distance of the land. My experience would lead me to prefer the latter, as the strong winds and frequent squalls which so often occur near the land sometimes allow a good long leg to be made to the north-westward, while, further off, this advantage is sacrificed for only a shade finer weather.

From the Galapagos Islands to Cape St. Lucas.—I have already alluded to the difficulty of getting to the westward from the Bay of Panama. The trade-wind seems to possess no steady influence to the eastward of a line drawn from Cape St. Lucas, in 22° N. to the Galapagos islands on the equator. Amongst these islands the south-eastern trade wind is steady during nine or ten months of the year, and it is only in January and February, and sometimes March, that they are interrupted by long calms, and occasional breezes North and N.W., but these are never of any great strength. To the northward of them, the eastern limit of the trade seems to depend upon the time of year. In the early part of April I have found it between the parallels of 8° and 13° N., 900 to 1,000 miles further to the eastward than at the end of June; and in the intermediate months, either more or less to the eastward as it was earlier or later in the season, but in no case that I have met with has a steady or regular trade been experienced till the above line has been reached. It is this circumstance, and the prevalence in the intermediate space of westerly winds, calms, and contrary currents, that makes the passage from Panama to the westward, as far as this line, so tedious. I have been forty days beating from the entrance of the bay in 80°

* Of the tedious nature of this navigation, the following sad account will be a good example:—The barque *Emily*, from London, sailed from Panama for San Francisco on the 7th of March (1852), and after being out NINETY-FIVE days put into San Blas, with nineteen of the passengers dead. The passengers were then transferred to the *Archibald Gracie*, and they were sixty-five days on the passage to San Francisco, during which time eighteen more of the passengers died. The sufferings endured by the unfortunate passengers is almost beyond description. For the last thirteen days of the passage they were on an allowance of a pint of water per day, and totally without provisions.

W., to the eastern edge of the trade in 111° W., a distance of less than 2,000 miles, or on an average about 40 miles per day.

From the Meridian of Cape St. Lucas Westward.—When once within the influence of the trade, a passage is easily made either to the southward, westward, or northward; but it must be borne in mind that the eastern verge of this seems, in these parts, to be influenced by the seasons. Thus, in June and July, I found it fresh from N.N.W., and even at times N.W., as far out as the meridian of 125° W., whereas in March and April it was light from N.N.E. to E. and E.S.E., from our first meeting it in 98° W., till past the meridian of Cape St. Lucas in 110° W., where I picked up a good steady breeze from N.N.E.

As a general rule the wind is found to haul more to the eastward as you get farther off the land, and I did not find this rule affected by the latitude; as, although, as I have stated, the wind hangs to the northward, and even at times to the westward of North, near the eastern limit of the trade, from the tropic of Cancer to the variables near the equator, I found it about the meridian of the Sandwich islands as far to the eastward on and near the line as it was in 35° N., in which latitude the westerly winds are in general met with.

The following remarks on the passage from South America to Central America, are by Captain De Lapelin, who was sent in the French corvette *La Brillante* to make a reconnaissance of the hydrography of the coast of Central America in 1852.

Whatever may be the point of departure, the first track should take nearly on the meridian of the islands of St. Ambrose and Felix, in order to gain the S.E. trades. After that stern so as to pass some leagues to the West of Point Ajuja, to gain the fine South and S.S.W. breezes which blow throughout the year, and will carry you up with Cape Blanco (Gulf of Guayaquil), which should be made to correct the reckoning. Thence cross the line in about 83° or 84° W., keeping 50 leagues at least from the Galapagos. From the equator the destination will regulate the route. If bound to the Gulf of Dulce, or any point East of Pt. Herradura, in the Gulf of Mexico, always endeavour to make Point Burrica. If bound for the Gulf of Nicoya make for Cape Blanco, and if for Realejo, make for the Volcano el Viejo, from whence you can easily fetch any point to the West of the Gulf of Papagayos.

But if bound for Acajutla or San Jose de Guatemala, a direct route from the line passes near to Cocos island, which being well laid down will make a good point of departure, and then the volcanoes of Central America form excellent landmarks for the ports, as described in the directions. But from May to November, a period when these landmarks are seldom visible, the high lands there being almost always hidden by haze, vessels from the South

should make for Cape Blanco, and then follow the coast at a distance of 12 to 15 miles, which can be done without danger. Some think that it is always best for a vessel from the South to make Cape Blanco of Guayaquil, and then Cape Blanco of Nicoya, and then by following the coast that they will find the breezes stronger and the current always favourable.

COAST OF CALIFORNIA.

The following brief instructions are derived from the Report of the United States Surveyors:—

Sailing vessels bound to the northward from Monterey, or any more northern port during the summer season, should stand well off-shore, not too close hauled, until about 200 miles from the land, when they will be beyond the influence of the southerly current, and in a situation to take advantage of a slant of wind which frequently occurs from the W.N.W. They would do well not to approach the land, unless favoured by the winds so as to enable them to lay their course, or nearly so, until up with the latitude of the destined port.

Steamers should follow the coast from point to point as nearly as possible, always keeping within 15 miles of the land. They will by this means shorten the distance, and frequently avoid the strong N.W. wind, as they will often find it quite calm close in with the shore, when there is a wind to seaward.

Vessels bound to the northward in the winter season should keep as close along the land as practicable, and take every advantage of all southerly winds to make latitude. They should always endeavour to make the land at least 20 or 30 miles to the southward of the destined harbour.

If bound to the southward keep the coast in sight, and take advantage of either tack upon which the most latitude may be made, always making the land to the northward of the port in summer, and to the southward in the winter season.

Bound to San Francisco or Monterey, use every opportunity to observe for latitude or longitude, so as to know the vessel's position up to the latest moment, as fogs and haze, preventing observations, prevail near the land. Allow generally for a southerly set of half a mile per hour, until within about 50 miles of the land; after which, at times, it is not appreciable. With these precautions vessels may steer boldly on, shaping a course for the South Farallon, an islet about 250 feet high and a mile long, having 14 fathoms water and good holding ground on the S.E. side.

On approaching soundings the water becomes of a pale green colour. Soundings may be had in 60 to 40 fathoms, soft ooze, if approaching point Reyes. Below 40 fathoms is near the land, and the surf should be heard, if haze prevents the land from being seen. If the soundings are 30 fathoms or under, and the sea smooth, anchor with a kedge until the land becomes

visible, so as to take a compass bearing, as the position cannot otherwise be relied on.

If up with the South Farallon and night approaching, or there are appearances of fog, anchor at the Farallon and wait till daylight, when the morning breeze will carry the vessel to the bar or pilot-ground.

Inside the Farallones the "set" is generally towards the North shore, which may be approached without risk, keeping outside of the kelp, that marks rocks under water.

SAN FRANCISCO.

Mr. Davidson, U.S.N., in his excellent directions for the western coast of the United States, gives the following statistics of the voyages made to and from San Francisco, which will be interesting; but each year seeing some improvement in the sailing powers of our ships, of course the average duration of the voyages become correspondingly shortened.

The number of clippers arriving at San Francisco from New York during the 10 years, 1850 to 1859, was 663, and the average length of the passage was 135.7 days. In the same years 373 arrived from Boston, and the average passage was 136 days.

In 1850 six clippers arrived from New York averaging only 115 days; the *Sea Witch* being reported at 97 days, but her actual passage was 101. The average passage of all American vessels that arrived from Atlantic ports was 187 days.

In 1851 only two clippers made the passage in less than 100 days—the *Surprise* in 96, and the *Flying Cloud* in 90, both from New York.

In 1852 the *Flying Fish* made it in 98 from Boston, and the *Sword Fish* in 93 from New York.

In 1853 it was made by the *Contest* in 97 days, *Flying Fish* in 92, *John Gilpin* in 93, and the *Oriental* reported 100; all from New York.

In 1854 the passage was made by the *David Brown* in 98 days, the *Flying Cloud* in 89, the *Hurricane* in 99, the *Witchcraft* in 97, from New York; and by the *Romance of the Seas* in 96 days from Boston.

In 1855 no vessel made it in 100 days, although the *Herald of the Morning* and *Neptune's Car* reported in 100 from New York, and the *Westward Ho* in 100 from Boston.

In 1856 the *Antelope* made it in 97 days, and the *Sweepstakes* in 94 from New York.

In 1857 the *Flying Dragon* arrived in 98 days, and the *Great Republic* in 92 from New York. The Danish clipper *Cimbar* made the trip from Liverpool in 106 days, the quickest on record.

In 1858 the ship *Twilight* made the passage in 100 days, and the *Andrew Jackson* in 99 days from New York.

In 1859 no vessel made the passage in 100 days. The *Andrew Jackson* made the shortest trip in 102 days from New York.

In 1860 the ship *Sierra Nevada* made the passage from Boston in 97½ days, and the *Andrew Jackson* from New York in 90½ days.

The shortest passage made from New York to San Francisco by steamship, via the Isthmus of Panama, was by the *Moses Taylor*, on the eastern side, and the *Golden Age* on the western, their actual running time 19 days 23 hours; total time from dock to wharf 21 days, 2 hours, 13 minutes, arriving at San Francisco February 26, 1858.

The clipper *Northern Light*, of Boston, is reported to have made the run from San Francisco to New York, in ballast, in 75½ days, and the *Trade Wind*, with cargo, in 84 days. The average time of passage is about 100 days.

The average length of passages from other prominent ports is given for the years 1857, 1858, and 1859.

From *China* 32 vessels arrived in 1857, averaging 59 days, the quickest trip from Shanghai being 34 days, by the tern *Spray*, and from Hong Kong in 35 days, by the schooner *Giulietta*.

In 1858 28 vessels arrived, averaging 53 days, and in 1859 28 vessels, averaging 54½ days.

From *Honolulu* 19 vessels arrived in 1851, averaging 19½ days, the shortest trip being made by the barque *Yankee*, in 13 days.

In 1858 25 vessels arrived, averaging 15 days, the shortest trip being made by the barque *Yankee*, in 11 days. In 1859, 20 vessels arrived, averaging 20 days, the shortest passage being by the barque *Onward*, in 10 days.

For a period of five years ending August 1, 1859, a record was kept of 427 passages between San Francisco and Honolulu. The average time of 224 passages from San Francisco to Honolulu was 16½ days, four being made in 9½ days each. The average time of 203 passages from Honolulu to San Francisco was 23 days, three being made in 11 days each.

From *Valparaiso* 17 vessels arrived in 1857, averaging 54 days, the shortest passage being made by the Danish ship *Velox*, in 37 days. In 1858 16 vessels arrived, averaging 73 days.

From *Australia* 13 vessels arrived in 1857, averaging 81½ days out, the shortest passage by the topsail schooner *Vaquero*, in 57 days. In 1858 14 vessels arrived, averaging 80 days, the shortest passage being made by the *Vaquero* in 54 days. In 1859, 27 vessels arrived, averaging 76 days.

BETWEEN CALIFORNIA AND CHINA.

In the preceding passages we have alluded to a system of navigation almost exclusively governed by local causes, and which, so far, are in reality not restricted to the shortest distance between the respective places. In getting beyond the verge of the trade winds, and in laying a track which embraces so many degrees of longitude as the distances between the above countries, it becomes another matter which is the shortest as well as the best course to pursue. As we have elsewhere described in the passage between Australia and the southern part of America, the great circle course becomes fully developed.

In the voyage from East to West, of course the readiest method is to gain the parallels of the trade-winds as soon as convenient, and by these means run down the westing, which in this case brings the ship to her destination.

But the return voyage is another matter, and the probably best track leads into very different regions. Thus the rhumb course from the Bashee channel between Formosa and the Philippine islands to San Francisco, is about E. 9° N; but the great circle course, from the same point, runs first N. 46° E., so that it touches the eastern part of the Madjico-sima islands, inside or to the West of the Loochoo islands, and then cuts the S.E. cape of Nippon. Farther eastward it attains the latitude of 48° N, longitude 169° W, and then proceeds East and E.S.E. towards San Francisco; so that San Francisco bears N.E. $\frac{3}{4}$ E., true, from Hong Kong, and Hong Kong bears N.W. $\frac{3}{4}$ N. from San Francisco.

It will be very readily comprehended that a track so widely differing from the rhumb bearing of E. $\frac{3}{4}$ N. allows a wide range of choice for improving the passage, so that a ship immediately on getting off the China coast may bear at once to the northward, and availing herself of the S.W. winds which predominate to the northward, may also be assisted by the strong north-easterly current setting along the outer coast of the Japanese Archipelago, and probably extending its influence nearly to the American coast.

It is also a question whether it would not be advantageous to make the first portion of the passage inside the Japanese islands, and enter the North Pacific by the Strait of Tsugar or Sangar; as the most direct track is not very far distant from such a course, and cannot be by any means lengthened by pursuing it.

This single instance will serve to direct attention to the wide variation that the great circle course is from that ordinarily pursued. And by specially applying its principles to any other points on the western coast of America,

and the ports on the opposite side of the Pacific, it will be manifest that a very great range of ocean is left open to the navigator.

BETWEEN THE ISLANDS, ETC.

Sandwich Islands to Tahiti.—There is great difficulty in making this passage across the trades. The whalers and all others speak with great doubt of fetching Tahiti from the Sandwich islands. Captain Bruce says that a vessel should keep to the northward until she gets a start of wind before bearing for her destination. In his passage between them in November 1837, he had no variables near the line in coming South, and never could make easting on either tack, though he endeavoured by every means in his power to do so.

The *Imogene* left Karakakooa Bay, October 17, 1837; and, reaching the South point of the island after twenty-five hours' sail, bore away on a S.S.E. course with a fiery trade at E.N.E.; this failed on the 22nd; the ship was tacked to a southerly breeze, which lasted till the 25th, when a fresh S. by E. trade sprang up. Between the 21st and 25th an easterly current set for 30 to 35 miles a day; after that a westerly current of 16 to 40 miles per day was found. Every opportunity was seized to gain easting, and to get to windward of the meridian of Tahiti, but without success. The equator was crossed on October 28th, in long. $154^{\circ} 40'$, wind East by South, having been on a bow line ever since leaving Hawaii. Passed Bellingshausen island on November 5th; and, as the ship drew to the southward, the wind gradually came to East, E.N.E., and N.E., always bringing the port directly in the wind's eye. November 8th, passed Rimitara; on the 9th, squalls, with most terrific rain; on the 10th, the wind veered to N.W., and finally S.S.W.; on the 11th, saw Rurutu. The wind now favoured the ship, and for the first time since leaving Hawaii she laid her course, and continued to do so. Bearing W.N.W. 7 or 8 leagues, made Tahiti on the 13th, and anchored the same day at Papiete. Thus, had not a favourable change in the wind occurred in the latter portion of the passage, she would have been to leeward.

In the passage from Tahiti to Hawaii, Captain Beechey says:—From the time we passed Maitea we endeavoured to get to the eastward, and to cross the equator in about 150° West longitude, so that, when we met the N.E. trade wind, we might be well to windward. There is, otherwise, some difficulty in rounding Owhyhee, which should be done about 40 miles to the eastward to ensure the breeze. The passage between the Society and Sandwich islands routes differs from a navigation between the same parallels in the Atlantic, in the former being exempt from the long calms which sometimes prevail about the equator, and in the S.E. trade being more easterly. The westerly current is much the same in both; and if not attended to in the

Pacific, will carry a ship so far to leeward, that, by the time she reaches the parallel of the Sandwich islands, she will be a long way to westward, and have much difficulty in beating up to them.—(Beechey's Voyage, vol. i, page 230).

Across the Equator.—In a review of the routes of the U.S. Exploring Squadron from the Fiji islands to the Northern Hemisphere, Capt. Wilkes says:—"It will be apparent that there is no necessity for vessels bound to the northward and eastward across the Pacific Ocean, to make for the northern variables, as has heretofore been the practice, thus making a very circuitous course, and occupying a much greater portion of time, besides subjecting themselves to encounter much bad weather. This, however, is not to be understood as applying to vessels to the westward of long. 180°: they ought to make the shortest possible stay within the Trades; and if this is determined upon, they should steer due North, without regard to making easting, until they have fully entered the variables. It is, however, at times, very doubtful where they will encounter them; and as far as our experience goes, and that of other navigators whom I have consulted, they ought not to be expected short of lat. 27° to 20° N., to which parallel the Trades often reach. The great difficulty seems to be, with many, that on the first wind from the West being encountered, they are induced to believe that it will prove constant, when nine times out of ten they will be deceived.

Sandwich Islands to the Northward and Eastward.—The passages from the Sandwich islands to any part of the N.W. coast of America, are made by standing to the northward till the westerly winds are reached, when the run into the coast is easily made, taking care, however, if bound to a port to the southward of you, not to bear up till well in with the land, when north-westerly winds will be found to carry you down to the southward.

On this coast, as a general rule, the land should be made to the northward of the port you are bound to, as in almost all cases the wind and current both prevail from the northward from Vancouver island to Cape Corrientes of Mexico.

Though lying between the parallels of 19° and 23° N. the Sandwich islands are often visited during the winter months with strong breezes and gales from South and S.W., but for the rest of the year the trade wind blows pretty steadily. In making a passage from thence to the coast of Chili or Peru, the best way is to stand across the trade as near the wind as the topmast studding-sail will stand. This, as the direction of the wind is in general from E.N.E. to East, will enable you to make Tahiti, and pass the Society islands by one of the clear channels to the westward of them. It is of little use trying to fetch to the eastward of these, as not only do you lose much

time by hugging the wind too close, but also the strong current, which sets to the westward from 20 to 40 miles a day, is pretty sure to drift you that much to leeward; and even were this not the case, so difficult, tedious, and dangerous is the navigation amongst the archipelago of low coral islands which lie to the eastward, that, unless you can weather the Marquesas altogether, it is better even to bear up, than to entangle yourself in such a labyrinth. After passing the Society islands stand on to the southward, till in or about the 30th parallel, when the westerly winds will be found. These will carry you into the coast; care being taken, as on the northern coast, not to bear up when within the influence of the southerly winds, till near enough to the land to ensure keeping them down to your port.

The foregoing will be all that is necessary to elucidate the navigation of the North Pacific Ocean, which is very simple when away from the land influences which cause the embarrassing winds, calms, and currents, which have been alluded to. The illustrative charts of the Winds, Currents, and Passages, will enable the navigator to choose the best route and readiest means of shortening a passage not specifically described.

In closing this book, which may be taken as the concluding volume of the series of six which describe the great oceans of the world, the author has much gratification in mentally reviewing his past labours, and the pleasures it has given him to collect the funds of varied information they contain. The coasts of the whole world have been described in them. The ports open to its commerce, the dangers which are to be avoided by its mariners, the innumerable features of interest and wonder which distinguish its shores, are more or less minutely described or alluded to. The marvels of the oceans themselves, their depth, and the mighty circulatory systems which give but one uniform characteristic to the world of waters, the effects of the winds which blow over them, the meteorological influences which affect the sailors' avocation in every quarter of the globe, are all, it is trusted, faithfully represented in them.

In full confidence of their utility as thus collected, the especial thanks of the author are now accorded to all who have added to that rich mine of hydrographical literature, from which he has been able to draw the materials for these books.

In the preface to this, as in those to his other works, these obligations are

more especially particularised, and it is earnestly hoped that no source of information has been overlooked, or that there is any omission of acknowledgement to those who have furnished the materials for them.

INDEX.

- Aamak Island, 518
 Aba Bay, 680
 Abatanok Island, 507
 Abbey Hill, 197
 Abbey Point, 896
 Abbey Reef, 897
 Abolocheff Bay, 539
 Abre-ogo, 891
 Abreojos Point, 145-6
 Acahi-Fanahi Point, 801
 Acapulco, 79, 90, 92, 94, 914
 Acajutla, 3, 63, 68, 70
 Achachinskoi and Bay, 562
 Acland Islands, 303
 Acoucheki Island, 893
 Active Cove, 280
 Active Pass, 287, 291, 304-5
 Adair Bay, 132
 Adakh Island, 514
 Adam Peak, 901
 Adams, Point, 231, 234-5
 Addenbrooke Point, 426
 Addington, Cape, 468
 Adeloup Point, 801
 Admiral Island, 294, 298,
 302, 306
 Admiralty Inlet and Head,
 257-8
 Admiralty Island, 459, 464
 Adranoff Islands, 500
 Aektok Island, 507
 Affleck Canal, 457
 Afognac Island, 493, 496
 Afuera, 19, 20
 Afuera, Silva de, 23
 Afulfa Morro, 128
 Agamemnon Channel, 403
 Agana, 799, 801
 Agat, 799, 801
 Agattou Island, 516
 Ageach Island, 502
 Agenhu Island, 897
 Agfayan Bay, 803
 Agrigan Island, 804, 814
 Agougak River, 520
 Agua, Volcan de, 3, 73, 74
 Aguatulco, Port of, 90
 Aguijan Island, 804
 Ahayan Point and Bay, 798
 Ahmen Creek, 211
 North Pacific.
 Aian, Port, 571
 Ailinginae Island, 727
 Ailinglabelab Islands, 730
 Ailak Island, 724-5
 Aino Sima, 675
 Airik Island, 722
 Ai Sima, 602, 607, 664, 666
 Ajayan and Point, 798, 801,
 803
 Aji River, 611
 Ajikawa River, 611
 Ajiro Bay, 632
 Ajuja, Rio, 34
 Akamokum Island, 775
 Akasi Strait, 609, 610
 Akenose Misaki, 608
 Akin Reef, 891
 Akona District, 836
 Akoun Island, 507
 Akoutan Island and Strait,
 507, 608, 511
 Akounskoi Strait, 507
 Akunora, 678
 Akuisi Sima, 893
 Alaid Island, 662
 Alamagan Island, 813
 Alan Point and Island, 265
 268
 Alarm Rock, 300, 301
 Alaska, 918
 Alaska Coast, 443
 Alaska Territory, 435
 Alava Point, 450
 Alberni Inlet, 328, 331, 337
 Albert Head, 319
 Albert Peninsula, 589
 Albion River, 204
 Alcas Rock, 548
 Alcatraz Island, 92, 185,
 187, 191
 Alcmene Island, 892
 Alden Bank, 276-7, 280, 289
 Alert Bay, 418
 Alert, Port, 700
 Alet Island, 761
 Aleutian Islands, 498, 504
 Alexander Point, 404, 455
 Alexander, Port, 420, 421
 Alexandroffsk, Fort, 489,
 521
 Alexandrovsky, 582
 Alexinoy Island, 502
 Algerino Bluff, 673
 Aliaska, 501, 504, 518
 Alice Thorndyke Reef, 703
 Alijos, Los, 858
 Alijos Rocks, 145
 Ali Sima, 617
 Alitok Bay, 496
 Alki, 260
 Allen Bank, 259, 261
 Allen Island, 716
 Allen's Islands, 134
 Almagro Island, 129
 Almejas Bay, 141
 Aloupan Island, 500
 Alpha Island, 325
 Alseya River, 228
 Altar, 130
 Aitas, Sierras, 175
 Altata and River, 124
 Althorp, Port, 469
 Altona Gulf, 476
 Alutung Island, 800
 Amagi-yama Mount, 632
 Amakusa Island, 681
 Amantes, Point de los,
 802
 Amapala, Gulf of, 56, 58
 Amapala Mountain, 59
 Amatignak Island, 515
 Amatitlan Lake, 73
 Ambernok River, 780
 Ameca Bay, 104
 Amelius Point, 457
 America Bay, 589
 American Anchorage, 641
 American Islands, 699
 Americano, Estero, 200
 Amherst Rocks, 683
 Amliia Island, 512
 Amphitrite Channel, 564
 Amphitrite Point, 340
 Amsterdam Island, 891
 Amtschitka, Cape, 508
 Amtschitka Island, 504, 515
 Amortajada Bay, 137
 Amoughta Island and Chan-
 nel, 511
 Amur Bay, 588

- Amur River, 567, 573
 Amur, Gulf of, 580, 584
 Amytiden Island, 760
 Anacapa Island, 161, 169
 Anachoretas Island, 776
 Anadyrsk, 546
 Anadyr, Gulf of, 541
 Anadyr River, 546
 Ananga-ura, 615
 Anatajan Island, 811
 Anataxan Island, 811
 Anchorage Island, 366, 618
 Anchorites Island, 776
 Anchor Point, 490
 Ancon, Cerro, 11, 13
 Anda-rivel, The, 73
 Andema Islands, 751
 Anderson Island, 263, 531
 Andreanoff Islands, 511, 514
 Andrews Island, 859
 Andrews, Port, 488
 Angaligarail Island, 764
 Angaur Island, 775
 Angel de la Guardia Island, 133
 Angel Island, 189
 Angeles Bay, 131, 134
 Angeles Island, 133
 Angeles, Los, 160
 Angeles, Port, 91
 Angeles Point and Port, 254-5
 Anian, Strait of, 257
 Anil Island, 721
 Animak Island, 503
 Anita Rock, 188
 Aniwa, Cape and Bay, 573, 577
 Anmer Point, 462
 Anna Island, 783
 Annette Creek, 304
 Anonima Island, 759
 Ano Nuevo Point, 177, 180
 Anson Road, 805
 Anson Shoal, 817
 Ant Islands, 751
 Anvil Island, 399
 Anvil Peak, 385
 Aoga Island, 628
 Aosiama yama, 669
 Aoumi Sima, 664-5
 Aoura Island, 742
 Apaiang Island, 708, 716
 Apamama Island, 714
 Apapa Island, 800
 Apex Strait, 669
 Aphoon River, 524
 Apia Island, 716
 Apollos Island, 891
 Apple-tree Cove, 259
 Apra Island, 800
 Apua, 825
 Apurguan Point, 801
 Arabia Shoal, 859, 861
 Arachne Reef, 296
 Arago, Cape, 224
 Aragouzet Islands, 772
 Arakmtchetchen Id., 539
 Araktcheeff Islands, 722
 Aranjuez River, 37
 Aranuka Island, 708, 713
 Arari Bay, 623-4
 Arari Point, 618
 Ara Sima, 624
 Arauca Barba Point, 42
 Arboleta, 126
 Arbutus Island, 207
 Archangel Gabriel Bay, 546
 Archangel, New, 473, 920
 Archimede Island, 893
 Arch Rock, 158
 Arden Point, 462
 Ardilla Island, 129
 Arcna Point, 203
 Aronas, Puntas, 4
 Arenas, Punta, 37
 Arenitas, Punta, 31
 Arguello Point, 172
 Argun River, 584-5
 Arhno Island, 721
 Arimoa Islands, 780
 Arispe, 123
 Arita River, 616
 Arizona, 131
 Armoura River, 542
 Armstrong, Port, 468
 Arno Islands, 722
 Arnold's Point, 132
 Arnold Rock, 357
 Arore Island, 710
 Arran Rapids, 410
 Arrecifos Islands, 733
 Arrinas, Islands, Las, 133
 Arrowsmith Island, 721
 Arrowsmith, Mount, 393
 Arteck Island, 773
 Arthur's Island, 732
 Artingale District, 773
 Aru Point, 745
 Aru Rock, 548
 Arurai Island, 710
 Arvata, 208
 Arzobispo Islands, 878
 Asan Island, 796
 Ascension Islands, 743
 Aseradores Island, 50, 52
 Asia, East Cape of, 529
 Asia Islands, 781
 Asina Bay, 638
 Aska Sima, 669, 685
 Aspinwall, 12
 Assatchinskoi Volcano, 551
 Asses Ears, 10
 Asses Ears Group, 682
 Assinia Islands, 682
 Assumption Island, 815
 Astley, Point, 462
 Astoria, 238-9, 446, 916
 Astor Point, 238-9
 Astrolabe Gulf, 778
 Astrolabe Rock, 661
 Atami, 637
 Atcha Island, 512
 Athos, Mount, 540
 Atitlan Volcano, 73, 74
 Atkins Reef, 306
 Asuncion Island, 146, 815
 Atkha Island, 512
 Atkinson Point, 384-4, 399
 Atkia, Port, 654
 Atlantic Island, 742
 Atooi Island, 818, 852
 Atos Creek, 178
 Atowai Island, 852
 Atsusi-no O sima, 668
 Atcheun, Cape, 543
 Attou Island, 505, 516
 Anau Channel, 844
 Audrincia, Punta de la, 98
 Augusta, Point, 468
 Augusta, Port, 394-5
 Aurh Island, 719, 722
 Austro, Cape, 52
 Avatcha Volcano and Bay, 551, 555, 558
 Aves Islands, 37
 Avinoff, Cape, 522
 Avos Rock, 564
 Awadji, 610
 Awadsi Island, 609
 Awa Peninsula, 633
 Awa Sima, 608 657-8
 Awatcha Road, 555
 Ayak Island, 527
 Ayan, Port, 571
 Ayongadagh Island, 516
 Ayuca, Morro, 85
 Ayuta de Santiago de Ystapa, 85
 Azada Island, 117
 Aziak Island, 527
 Bebelthup Island, 773
 Baboushka Island, 666
 Baboushka Rock, 558
 Bacon Hill, 323
 Bache, Mount, 179
 Bagona Hills and River, 112
 Bahia Honda, 19
 Bahia Ona, 180
 Baikul Lake, 584
 Bailey Islands, 884
 Bainbridge Island, 260
 Bainbridge Port, 486
 Baja, Punta, 127
 Bajo Point, 354
 Bajo Rajado, 26
 Bajo Reef, 350, 351
 Bajo Reef, Inner, 354
 Baker's Bay, 232, 238, 241
 Baker Island, 703
 Baker Mount, 267
 Baker Pass, 405
 Baker Point, 456
 Balacava Island, 421
 Balbi Point, 587
 Balch Passage, 263
 Bald Head, 526
 Bald Pate Mount, 181
 Bali Island, 789
 Ballast Point, 156
 Ball Cape, 439, 443
 Ballenas Bay, 145
 Ballena, Rock La, 34
 Ballena Port, 137
 Ballenas and Bay, 194-5
 Ballenita Rocks, La, 34

INDEX.

979

- Bullinac Island and Channel, 391-2
- Bullouzek Cape, 591
- Balsa, Punta de la, 180
- Balshe Unala, Riko, 481
- Baltasar Head, 18
- Bamba Bay, 85
- Bainfield Creek, 329
- Banaba Island, 717
- Banco, Punta del, 31, 32
- Banks Island, 430, 432
- Banks, Port, 476
- Baraco, 27
- Baranca River, 37
- Baranoff Island, 467-8
- Barbacoas, 12
- Barbadoes Islands, 723
- Barbary Island, 703
- Barber Island, 703
- Barclay Sound, 312, 323, 332, 337
- Bare Island, 288, 292, 295, 298, 342, 369
- Bare Point, 299
- Barflur Pass, 400
- Baring Islands, 730-1
- Barlow Cove, 463
- Barnabas, Cape, 496
- Barnett, Cape, 458
- Barnes Island, 276
- Barnoveld's Island, 625
- Barney's Rock, 859
- Barnpool, 897
- Barracouta Harbour and Bay, 580, 581
- Barracouta Rock, 676
- Barra del Espiritu Santo, 65
- Barra Falsa, 52
- Barren Island, 495
- Barr Island, 721
- Barrick Rock, 657
- Barrie Point, 456
- Barrier Group, 359, 362
- Barrier Island, 572
- Barrow Bay, 899
- Barter Cove, 362
- Bartholomew Island, 7
- Bartlett Island, 343
- Base Flat, 394
- Base Point, 346
- Base Reef-tied Islands, 722
- Bassiosus Island, 866
- Bat Islands, 41
- Battery Point, 212, 260, 509
- Battle Bay, 363, 364
- Battle Rock, 221
- Baibelthouap Island, 773
- Bau Island, 930
- Baugno Point, 800
- Bawden Bay, 347
- Baxo Trista Island, 754
- Baynes Channel, 325
- Baynes Sound, 391-393
- Bayoneta Island, 7
- Bayonnaise Island, La, 629
- Bay Rock, 681
- Bazan Port, 458
- Brazil Point, 487
- Beacon Hill, 323
- Beacon Point, 640
- Beacon Rock, 389
- Beak Point, 394
- Beale, Cape, 329, 331, 333
- Bear Creek, 206
- Beaton Island, 452
- Beaulere, Port, 457
- Beaufort Mountains, 391, 395
- Beaver Cove, 4, 417
- Beaver Harbour, 419
- Beaver Point, 302
- Beaver Rock, 413
- Becher Bay, 317
- Becher Mount, 395
- Bele Point, 489
- Bedford Islands, 317
- Bedwell Harbour, 291
- Bedwell Inlet, 369
- Bedwell Sound, 344
- Beechey Head, 317
- Beechey Group, The, 880
- Bee Islands, 407
- Begg Rock, 168
- Behm Canal, 450
- Behring Bay, 476, 477
- Behring Cape, 544
- Behring Island, 548
- Behring Sea, 517, 498, 920
- Behring Strait, 529
- Behring Vessel Bay, 546
- Belhoula, 428
- Belle Rock, 274-5
- Bell Island, 451
- Belitre Point, 23
- Bella Coola River, 428
- Bellingham Bay, 268, 274
- Bellingshausen, Cape, 576
- Bello, Porto, 10
- Belmont Point, 355
- Benado Islands, 16, 24, 27
- Benoist Mount, 779
- Bentinck Arms, 427
- Bentinck Island, 318-19
- Bentinck Point, 483
- Berner Bay, 466
- Bernizet Peak, 573
- Berry Point, 387
- Bertrand Island, 778
- Besborough Island, 525-26
- Best Island, 789
- Betchevinskaja Bay, 555
- Bierka Island, 473
- Bigali Island, 762
- Bigar or Bikar Island, 725
- Bight Cove, 354
- Bikini (or Bigini) Islands, 727
- Bingham Point, 470
- Bingo Nada, 601, 606, 610
- Binzli Reef, 618
- Biorka Island, 475
- Birch Bay, 269
- Bird Island, 295, 724, 810, 856
- Bird Reef, 299
- Bird Rock, 188, 193, 274, 275
- Bird's Cape, 515
- Bird's-eye Cove, 299
- Birds Islands, 337
- Birnie Island, 433, 449
- Biro Sima, 672
- Birthday Channel, 357
- Bishop Island, 707, 711
- Bishop Junction Islands, 723
- Bishop Rock, 165, 888-9
- Bittern Rocks, 646, 658
- Bitumen Springs, 160
- Biwa, Lake, 611, 663
- Black and White Rock, 607
- Black Cape, 509
- Black Head, 98
- Black Islands, 283
- Black Mountain, 180
- Black Point, 187
- Black Rock, 368, 338, 630, 633
- Blacklock Shoal, 761
- Blagniere Point, 454
- Blake Island, 261
- Blake Reef, 892
- Blakely Harbour, 260
- Blanco, Cape, 35, 39, 222, 645, 914
- Blanco, Fort, 185
- Blancos Islands, 98
- Blaney Island, 713
- Bligan, Cape, 669
- Bligh Island, 352, 353, 484
- Bligni Islands, 505, 516
- Blind Bay, 286
- Blind Creek, 405-6
- Blind Reef, 356
- Blinkinsop Bay, 415
- Blonde Reef and Point, 830
- Blossom Reef, 896-7
- Blossom Rock (removed), 115, 188, 193
- Blue Mount, 197
- Bluff, Cape, 238
- Bluff, Fort, 106
- Blunden Island, 290, 291, 342
- Blunden Point, 391
- Blunt, Cape, 647
- Blunt Island, 267, 326
- Blunt's Rocks, 206-7
- Blyde Berg, 657
- Blying Sound, 488
- Boat River, 368
- Boatswain Bank, 297
- Bobrovaia Bay, 508
- Bobrovi Island, 534
- Boca Barra, 83
- Boca Brava, 24
- Boca-del-Inferno, 352
- Boca San Pedro, 28
- Bod-ga Head and Bay, 200
- Bodega, Port, 920
- Bodisko Peninsula, 587
- Bolano Island, 27
- Bolcherets, 561, 568
- Bolchoireka River, 568
- Bold Bluff, 298, 368, 370
- Bolshaya River, 568
- Bomasiri Island, 578

- Bona Island, 15
 Bona Vista Island, 805
 Boneta Point, 184, 195
 Bonham Islands, 726, 730
 Bonilla Island, 267
 Bonilla Point, 251, 314, 320
 Bonin Islands, 687, 878
 Bonnet Island, 670
 Boot Cove, 290
 Bordelaise Island, 753-4
 Borelino Islands, 890
 Borrough Bay, 451
 Boshi Yama, 672
 Bosphorus, Eastern, 680
 Boston Islands, 731
 Bottle Rock, 620
 Boudense Island, 776
 Bougainville Mount, 770
 Boughey Bay, 416
 Bouguenien, 721
 Boulder, 299
 Boulder Point, 409, 415
 Bouldyr Island, 516
 Boundary Bay, 269
 Boungo Channel, 596, 600
 Bourdieu Bay, 490
 Boussola Channel, 562
 Bowen Island, 385, 399, 400
 Bowyer Island, 399
 Boyarin Bay, 589
 Boyle Islands, 423
 Brace Point, 261
 Brackenridge Bluff, 247
 Bradfield Canal, 454
 Braithwaite Bay, 787
 Brama Point, 779
 Brancas Piedras, 92
 Brandten Eyland, 627
 Brat Chirnoef Island, 565
 Brava Island, 27, 28
 Brava Point, 9, 17
 Bridget Point, 466
 Bright Island, 305, 424
 Brincanco Island, 22
 Bristol Bay, 446, 520, 521
 British Columbia, 375, 425
 Brito, 46
 Britomart Reef, 816
 Broken Channel, 342
 Broken Group, 335
 Broken Head, 590
 Broken Islands, 334-5, 416, 626
 Broken Point, 285
 Brood Rocks, 626
 Brooke Island, 697
 Brooks Bay, 365, 367
 Brooks Island, 869
 Brooks Peninsula, 365
 Brooks Shoal, 863
 Broom Tree, 239
 B others Island, 323
 Brothers Islands, 781
 Brothy Ledge, 320, 322
 Brothers Point, 102
 Brothers Rock, 558
 Brothers Rocks, 671
 Broughton Bay, 902
 Broughton, Cape, 654
 Broughton Island, 565
 Broughton Strait, 417, 418
 Broughton Rock, 628
 Brown Channel, 690
 Brown Island, 278, 284
 Brown Islands, 729, 732
 Brown Pass, 432
 Brown Point, 246
 Browning Channel, 423
 Browning Creek, 370
 Browning Harbour, 290
 Browning Pass, 345, 421
 Browning Rock, 416
 Bruce, Port, 588
 Bruja Island, 130
 Bruja Rock, La, 25
 Bruja Point, 15, 93
 Bryant Point, 487
 Brydone Island, 591
 Buache Mount, 739
 Bucaroli, Port, 458
 Buchan, Monte de, 173
 Buckland Island, 880, 884
 Buck Point, 438, 441
 Bucksport, 208
 Budds Harbour, 255
 Budds Inlet, 262
 Buena Point, 41
 Buenaventura River, 9
 Buenaventura, San, 161
 Buoy Bank, 6
 Buoy Point, 12
 Buoy Rock, 26
 Bufadero, 90
 Buisaco Island, 634
 Bull Harbour, 420, 422
 Bull Pass, 402
 Bull Rock, 335, 371
 Bullock Bay, 592
 Bullock Bluff, 406
 Bultig Island, 781
 Bune Sima, 878
 Bungalow Island, 892
 Bunker Island, 69, 864
 Bunkey's Island, 759
 Bunn, 667
 Bunsby Island, 363
 Buonaparte River, 375
 Buoy Rocks, 587
 Burdwood Bay, 408
 Burdwood Point, 361
 Burgess Island, 342, 347
 Burgoyne Bay, 298
 Burial Island, 298
 Burica, 31
 Burica or Burrica Pt., 26, 29
 Burke Canal, 427, 428
 Burnt Hill, 369
 Burnt Island, 511, 514
 Burrard Inlet, 378, 384-5
 Burrows Island, 268, 875
 Burruca, Rio, 34
 Bush Point, 258
 Bushy Island, 455
 Bute Inlet, 406, 409
 Butaritari Island, 717
 Button Islands, 725
 Byers Island, 874
 Byki, Cape, 582
 Byron's Bay, 828
 Byron Island, 706, 710
 Caamano, Cape, 462
 Caballo, 21
 Caballos, Puerto, 56
 Cabra, Cerro de, 15
 Calmas Island, 800
 Cabra Spit, 15
 Cabra, Tetras de, 128
 Cacique Point, 40-1
 Cactus Island, 292
 Cadboro Bay, 324
 Cadboro Point, 289, 325
 Cadiak Island, 493
 Cagaves Island, 37
 Cahoon River, 225
 Calalan Reef, 800
 Calandare Point, 117
 Calderas, 3, 36
 Calder, Mount., 456
 Caledonia Bay, 6
 California, 152
 California, Gulf and Penin-
 sula, 119, 121, 123
 Callam Bay, 254
 Call Creek, 416
 Calm Channel, 409
 Calver, Cape, 319
 Calvert Island, 426, 722
 Calville, 131
 Camden, Port, 460
 Camira Island, 875
 Cammas Plains, 217
 Campana, Isla de la, 430
 Campbell Point, 492
 Campbell Reef, 754
 Camp Bay, 291
 Camp Cove, 286
 Camp Island, 407, 409
 Camp Point, 414, 417
 Campeche, Gulf of, 82
 Camuta Rios, 97
 Canal Island, 19
 Canas Island, 8
 Canaveral, Port, 432
 Candadillo Point, 64
 Canoe Island, 282, 309
 Canoe Reef, 346
 Canoe Rocks, 296
 Cano Island, 33, 35
 Canon, Grand, 132
 Caoba, 72
 Capalita River, 89
 Capeniur Island, 725
 Capero, Sicra, 15
 Capper Island, 859
 Capper's Island, 789
 Capricieuse Bay, 587
 Capstan Island, 337
 Capstan Head, 896, 897
 Captain Bay, 507
 Captain Pass, 303, 307
 Caracollo Island, 61
 Carapellas Islands, 772
 Cardon Chan. & Id., 50, 52
 Cardon, False, 55
 Careen Creek, 282
 Carey Island, 26

- Cariboo, 375
 Carmel Bay and Point, 175,
 176
 Carmen, Island del, 135,
 136
 Carolina Channel, 340
 Caroline Archipelago, 694,
 734
 Caroline Reef, 325
 Carr Bank, 541
 Carrington Bay, 406, 407,
 409
 Carr's Inlet, 262
 Carter Bay, 429
 Carter Reef, 782
 Cartwright Sound, 438, 441
 Casares, 47
 Casaya Island, 7
 Cascade Bay, 286
 Cascade Canal, 428
 Cascade Mountains, 217,
 260, 376
 Case's Inlet, 262
 Cascos Islands, 733
 Cassini Island, 587
 Castanon Bluff, 52
 Castanon Island, 50
 Castillos, La Villa de los,
 113
 Castle Point, 424, 590
 Castricum, Cape, 566
 Castries Bay and Point, 580,
 582
 Casey, Cape, 587
 Catala Island, 356
 Catalina Island, 136
 Catalina Point, 40
 Cat-face Mountains, 343,
 347
 Catharine, Cape, 580
 Catherino Islands, 728
 Cattle Islands, 420
 Cattle Point, 277, 326
 Caution, Cape, 426
 Caution Point, 279
 Cavallos, Punta de los, 189
 Cayado Hills and Cape, 23,
 24
 Cebaco Island, 17, 18
 Cecille Archipelago, 892
 Cecil Rock, 297
 Cedros Island, 147
 Coletao River, 228
 Celia Reef, 296
 Ceniza Fair, 54
 Cenizas Head, 150
 Central America, 1
 Centre Island, 407, 422, 634
 Centre Reef, 292, 309, 340
 Centre Rock, 325, 405
 Cerralbo Island, 138
 Cersy Peak, 777
 Cerro Morro, 83
 Cerros Island, 147
 Chacala, 104
 Chacktole Bay, 524
 Chacon, Cape de, 453
 Chagamil Mountain, 510
 Chagres, 12
 Chain Islands, 324, 303
 Chain Island, 355
 Chaktolmout Bay, 524
 Chalaltenango, 63
 Chalan Anita, Cape, 790
 Chalmers, Port, 487
 Chalque Island, 441
 Chame Bay and Point, 15
 Chamela, 103
 Chametha Hills and River,
 112
 Chamis Bay, 361
 Chamisso, Port, 756
 Chancellor Channel, 415
 Changarmi, 14
 Channel Island, 341, 403
 Channel Islets, 302
 Channel Point, 325
 Channel Reef, 334, 337, 357,
 367
 Chapera Island, 7
 Chapin, Cape, 541
 Charco Azul, 28
 Charles Island and Rock,
 281, 304, 306, 307
 Charlotte Island, 716
 Chasintzoff, 453
 Chat Chan Point, 360
 Chatham Bay, 696
 Chatham Channel, 416
 Chatham Islands, 325, 723
 Chatham Strait, 459, 464-5,
 467
 Chatham Point, 411, 413
 Chatham, Port, 489
 Chatham Sound, 431-2
 Chelalis River, 246-7
 Chelighoff, or Chelekhoff
 Strait, 496, 497, 520
 Chelnitt Islands, 731
 Chermains Bay, 299, 300
 Chepillo Island, 10
 Chepo River, 10
 Cherry Point, 297
 Chestakoff Island, 519
 Chess Board Islands, 779
 Chet-ko River, 219
 Chiboko, 531
 Chica, Boca, 28
 Chichagoff Island, 467
 Chichakoff, Cape, 598, 635,
 922
 Chicaylis River, 217
 Chichaldinskoi and Volcano,
 506
 Chicapa River, 83
 Chicarene Point, 59, 62
 Chichkoff, Cape, 506
 Chief Rock, 363
 Chigah Island, 654
 Chikotan Island, 654
 Chilhat, 465
 Chimaltenango, 3
 Chimman and River, 9
 Chimmo Bay, 28
 Chimney Rock, 898
 Chimsain Peninsula, 434
 Chinche Island, 20
 Chinche Bay, 20
 Chinendega, Old, 46
 Chiniatskoy Bay, 494
 Chinois River, 247
 Chinoak Point, 241
 Chioreto River, 799
 Chipre Island, 7
 Chiquirin Bay, 62
 Chirambira Point, 911
 Chirin-kotan Island, 564
 Chirikoff, Cape, 929
 Chirnoef Island, 565
 Chirique Lagoon, 3
 Chiriqui Bay, 24
 Chiriqui Coast, 28
 Chiriquin Point, 59
 Chirnoi Brothers Island, 565
 Chirnoi Island, 565
 Chismuyo Bay, 56
 Chiswell Islands, 488
 Choco Bay, 911
 Chofu, Hagi, 604
 Cholmondeley Sound, 453
 Choluteca River, 3
 Chome Island, 586
 Choncha Pelona, 33
 Chonga, Cerro del, 87
 Choukotskoi, Cape, 530
 Choutales, 48
 Chramtschenko Islands, 730
 Christian Island, 667
 Christie Pass, 421
 Christian Sound, 459, 464
 Christmas Harbour, 723
 Christmas Island, 697
 Chuchegul, 26
 Chuchican, Ensenada de, 26
 Chugachnik Bay, 490
 Chung-chi Island, 899, 901
 Church, Cape, 317, 318
 Ciervo Island, 116
 Cinalo, 123
 Claasit, 216
 Clallums, 255
 Clam Bay, 299, 306, 309
 Clan-ninick Harbour, 359,
 362
 Clara Island, 363
 Clara, Santa, 50
 Clarence Island, 131
 Clarence, Port, 527
 Clarence Strait, 452
 Clarence Strait, Duke of,
 452
 Clarion Island, 788
 Clark Island, 276, 280
 Claro, Rio, 29
 Classet, Cape, 252
 Clatsop and Beach, 235
 Clatsop Channel, 238
 Clayquot Sound, 341, 346,
 347
 Clements Reef, 280-1, 283
 Cleopatre Island, 893
 Clerke Island, 531
 Clerke Reefs, 365
 Clerk Island, 711, 716
 Cleopha, 105
 Cliff Island, 284
 Climate, Alaska, 448

- Climate, Caroline Islands, 736
 —, Central America, 4
 —, Mexico, 80
 —, Sandwich Islands, 822
 Clio Rock, 92
 Clipperton Island or Rock, 785
 Cloud Island, 789
 Clover Point, 323
 Coal Bay, 489, 490
 Coalcamen, Rio, 97
 Coal Harbour, 372, 385
 Coal Island, 295
 Coal Point, 221, 297
 Coaster Channel, 336
 Cobre, Arroyo del, 21
 Cochore, 128
 Cochrane Point, 485
 Cocino Island, 103
 Cockburn, Cape, 404
 Cocoa-nut Cove and Island, 830
 Cocoa-nut Island, 829
 Cocos Bay, 40
 Cocos Island, 62, 695, 798
 Cocos Point, 8
 Coffin Island, 299, 371, 629
 Coffin Harbour, 879, 885, 886
 Coiba Island, 17, 19
 Cojutepeque, 68
 Coke Point, 492
 Colima, 99
 Colima Volcano, 79, 98, 100
 Collingwood Channel, 399
 Colnett, Cape, 150
 Colnett Island, 665
 Colombia, Islas de, 6
 Colon, 12
 Colorado and Island, 102, 103
 Colorado, Punta, 135
 Colorado, Rio, 121-2, 130-1
 Colpoys Point, 455
 Columbia River, 212, 217, 232, 236, 241
 Column Peak, 10
 Columnas Island, 875
 Colville, Cape, 274
 Colvos Passage, 261
 Colvos Rocks, 264
 Colwood Farm, 322
 Colwood Islet, 355
 Comayagua, 3
 Commander Islands, 548
 Commerell, Cape, 421, 424
 Commencement Bay, 261
 Commerson Island, 776
 Company's Island, 565
 Compass, Variation of the, 952
 Comptroller Bay, 482
 Conte Heiden Bay, 519
 Concepcion de Caborca, Rio de la, 130
 Concepcion Point, 134, 222, 916
 Concepcion, Sierra, & Point, 162-3
 Concession, The, 613
 Conchagua Bay, 3
 Conchagua, Gulf of, 56, 62
 Conchaguilla Island, 56
 Conclusion Island, 456
 Conclusion, Port, 467
 Conceñi Reef, 291
 Concordia, 45, 63, 66
 Cone Island, 347, 606
 Conejo Island, 23
 Congo, Cerro, 8
 Congress Island, 877
 Conical Island, 617
 Conuma Peak, 351, 353
 Cono Island, 20
 Conqueror Bank, 608
 Constance Bank, 326
 Constance Cove, 319, 321
 Constance, Mount, 265
 Constantine, Cape, 520
 Constantine Harbour, 484
 Constantin Island, 753
 Constitution Mountain, 276, 285, 379
 Contadora Island and Channel, 7
 Contra Costa Mountains, 183
 Contreras Islands, 22
 Converden, Point, 465, 468
 Conversion Point, 161
 Cook, Cape, 327, 364, 365
 Cook Inlet, 446, 489, 919
 Cook River Inlet, 476
 Cook's Island, 715
 Cook Strait, 522
 Cooper Inlet, 316
 Cooper Islets, 893
 Cooper's Island, 789, 859
 Cooper Reef, 297
 Copalis River, 246-7
 Copalux River, 244
 Copper Island, 330, 317, 649, 789, 859
 Coquille Island, 762
 Coquille Islands, 731
 Coquille Harbour, 741
 Coquille River, 223
 Coral Islands, 690
 Corcovado Rock, 33
 Cordilleras, 79
 Cordonazo de San Francisco, 80, 111
 Cordova Bay and Port, 458
 Cordova Channel, 287, 289, 295
 Cordova, Port, 484
 Corea Strait, 597
 Cormorant Bay, 289
 Cormorant Island, 418
 Cormorant Rock, 420
 Cornwallis Bay, 787
 Cornwallis Islands, 790
 Cornwallis Point, 459
 Corvetana Rock, La, 104
 Coronados Islands, 151
 Coronados Island, 135
 Coronation Island, 457
 Coror Island, 772-3
 Corral Tierra, Punta de, 180
 Corrientes, Cape, 163
 Corroa Island, 773
 Corso, Cape, 144
 Cortes Island, 406-7
 Cortes, Sea of, 122
 Cortes Shoal, 164
 Cortoz, 56
 Coruma Island, 900
 Corvi Bay, 612
 Cosala, 123
 Cosaguina, 3, 49, 55
 Cosaguina Point, 58
 Costa del Balsamo, 68
 Costa Rica, 1, 29
 Costa Taseca, 47
 Costello Reef, 764
 Coto, Rio, 31, 32
 Cottam Reef, 392
 Coughiak Island, 491
 Countess Point, 486
 Count Heiden Islands, 724
 Courtenay River, 394, 395
 Covell Islands, 731
 Covey Island, 668
 Cowichen Head and Harbour, 288, 298
 Cowlitz Bay, 289, 294
 Cowlitz River, 217, 241
 Coxcomb Hill, 24
 Cox, Point, 341
 Cox Island, 425
 Coyuca, Papa of, 94, 96
 Cracroft Island, 417
 Craig Point, 455
 Crane Island, 284
 Crane Islands, 423
 Crane Shoal, 703
 Creasy, Cape, 589
 Crescent Bay, 252
 Crescent City and Bay, 211
 Crescent Point, 301
 Cresiente Island, 141
 Crespo Island, 875
 Creston Island, 112
 Cullion, Cape, 577, 579
 Crillon Mount, 471
 Crispin Rock, 290
 Croisilles, Cape, 778
 Crooze Island, 467
 Cross Sound, 467, 469, 470, 471
 Crown Island, 283, 777-8, 894
 Crown Princess, Wreck, 189
 Crozer Mount, 739
 Cuacaul Point, 92
 Cuchilla Grande, 195
 Culebra, 13
 Culebra, Port, 40, 41
 Culiacan, 123
 Culiacan River, 123
 Culross Point, 485
 Cumbra de las Auras, 181
 Cumming Point, 430
 Cumshewas Harbour, 438

INDEX.

983

- Curé Island, 868
- Current Island, 783
- Current Pass, 415
- Currents of the North Pacific Ocean, 934—951
 - in general, 934:
 - North Equatorial Current, 935; Equatorial Counter Current, 937; the Japanese Current, 941
 - 948; Sea of Japan, 948; Sea of Okhotsk, 949; Sea of Behring, 949; N.W. Coast of America, 950; Coast of California, 950; West Coast of Mexico, 950
 - Black Gulf, 941
 - Caroline Archipelago, 738
 - Central America, 4
 - Equatorial, 935
 - Japanese, 937, 941
 - Ladrone Islands, 796
 - North Pacific, 934
 - Sandwich Islands, 824
 - Vancouver Island, 313
- Custodios, Cape, 104
- Custodios River, 104
- Cuttle Group, 363
- Cuyler's Harbour, 170-1
- Cyclops Mountains, 779
- Cypress Bay, 343
- Cypress Cone and Id., 284
- Cypress Island and Reef, 268
- Cypress Point, 175
- Dædalus Pass, 420
- Daibo saki, 639
- Daizo Island, 607
- Dalco Point, 261
- Dallas Mountain, 293
- Dalrymple, Cape, 576
- Damas Bay, 18
- Damos, Port de, 18
- Dampier Island, 778
- Dampier Strait, 777
- Danaido Rocks, 13
- Danéono Island, 708
- Dangerouse Rock, La, 578
- Danger Island, 791
- Danger Islands, E. and W., 732
- Danger Reef, 299, 301, 310
- Danger Rock, 280, 294, 334, 337, 355, 582
- Danger Rocks, 369
- Danger Shoal, 292
- Daniel Island, 721
- D'Anville, Cape, 922
- D'Anville Gulf, 587
- Darby Cape, 526
- Darcy Island, 288, 295
- Dark Island, 344
- Dark Cove, 404
- Darkers Island, 875
- Dasima saki, 681
- David Town, 16, 27
- David Bay, 25
- David Channel, 339
- David River, 28
- Davidson Rock, 274
- Davis Bay, 275
- Dawson Island, 725
- Dawydoff Island, 516
- Day Point, 429
- Dead-tree Point, 438
- Dean Canal, 428
- Deans Dandas, Port, 589
- Decapolis Reef, 753
- Decatur Island, 275, 282
- Deception Channel, 343
- Deception Pass, 267, 345
- Deciarta Island, 875
- Decision, Cape, 457, 459, 464
- Decker's Island, 861
- De Courcy Island, 310
- Deep Bay, 394, 898
- Deep Cove, 297, 298, 399
- Deep Inlet, 360
- Deep Pass, 343-4
- Deep-water Bay, 413
- Deer Harbour, 284-5
- Deer Island, 27, 419
- Deer Islands, 329, 333
- Deer Lagoon, 259
- Defiance Point, 262
- De Fuca's Pillar, 252
- De Fuca Strait, 251, 274, 326
- Doik's Island, 875
- Délaroff Islands, 514
- Delarovskoi, 603
- Delaware Bank, 867
- Delgada Point, 142
- Delisle, Cape, 575
- Departure Bay, 389
- Denbigh, Cape, 524
- Denman Island, 391, 393
- Dent, Cape, 582
- Derbinskoi Strait, 506
- Derby, 384
- Descartes Point, 42
- Deserted Bay, 404
- Deserted Creek, 353
- Desgraciada, La, 818
- Desima, 677
- Desolado, Cape, 40, 47
- Desolation Sound, 405
- Despensa Island, 42
- Destitution, Cape, 582
- Destruction Island, 224, 249
- Devil's Ridge, 453
- De Vries, Cape, 566
- Dezima Island, 593
- Diablo Point, 187
- Diablo, Punta del, 801
- Diamante Point, 93—96
- Diamond Cape, 634
- Diamond Hill, 850
- Diamond Point, 286
- Diana Island, 330
- Diana Shoal, 703
- Diana Strait, 565
- Dickinson Point, 418
- Dick, Mount, 402
- Dick Port, 488
- Diggers Sound or Bay, 478
- Dillon Point and Rock, 420, 421
- Dinner Point, 2-4
- Diomed Islands, 529, 530
- Dionysius Mountain, 542
- Direction Bluff, 558
- Direction Mountain, 587
- Disappointment, Cape, 231, 235, 580, 592
- Disappointment Island, 888
- Disaster Island, 895
- Discovery Island, 287, 304
- Discovery Islands, 325
- Discovery Passage, 411, 413
- Discovery, Port, 256
- Disney Point, 280, 294
- Dixie Cove, 361
- Dixon Channel, 435
- Diyl Island, 613
- Djauré, Cape, 586
- Djino Sima, 616
- Dockyard Island, 370
- Dodd Narrows, 287, 290, 306, 309, 390
- Dodger Cove, 333-4
- Dodo Rocks, 645
- Dog Island, 713
- Dolores, Isla de, 249
- Dolores Island, 891
- Dolphin Point, 261
- Dominical Point, 34
- Dougal Head, 418
- Dougandsha Bay, 572
- Dorei, Port, 781
- Dory, Port, 781
- Do Sima, 668
- Dotensan, Peak of, 609
- Douangea, Cape, 572
- Double Bluff, 258
- Double Head, 646
- Double Island, 340, 344, 357
- Double-topped Mountain, 898
- Double-wedge Island, 665
- Douglas, Cape, 490, 497
- Douglas Channel, 277, 279
- Douglas Harbour, 442
- Douglas Island, 459, 463
- Douglas Mount, 289
- Douglas Rock, 888
- Dove Island, 729
- Dove Reef, 667, 686
- Downs Point, 575
- Doyle Island, 421, 423
- Dragon Rocks, 213, 219
- Drakes Island, 866
- Drayton Harbour, 270
- Drew Harbour, 406, 408, 409
- Drovianaia Cove, 509
- Drummond Island, 707, 711, 713
- Drew Rock, 291

- Dry Island, 869
 Duck Island, 672
 Dudemaine Island, 779
 Duke of Clarence Strait, 457
 Duke of York Archipelago, 454
 Dulce, Gulf of, 30, 32, 911
 Dulce River, 92
 Dume Point, 160
 Duncan Bay, 412
 Duncan Canal, 455
 Duncan Island, 421
 Duncan Rock, 253
 Dundas Island, 432, 714, 892
 Dundas, Point, 469
 Dungeness Bay, New, 255
 Dungeness, False, 255
 Dunkin Reef, 755
 Duntze Head, 320
 Duntze Rock, 263
 Duperré, 778
 Duperrey Island, 755
 Duperrey Islands, 742
 Du Petit Thouars Shoal, 142
 Durour Island, 777
 D'Urville Island, 755
 D'Urville, Point, 780
 Duval Point, 420
 Duwamish Bay, 260
 Duxbury Point and Reef, 191, 194, 200
 Dyke Point, 320
 Dzinozetti Channel, 613
- Eagle Harbour, 260
 Eagle Island, 263
 Ear Island, 767
 Earl Ledge, 415
 Ears Rock, The, 880
 East Cape of Asia, 535
 East Faiu Island, 759
 East Sound, 286
 Easy Creek, 361
 Eauripik Islands, 766
 Ebisima, 619
 Ebon Island, 719, 731
 Ecola Creek, 231
 Eddystone Rock, New, 450
 Edensaw's Village, 440
 Edgecumbe, Cape and Mountain, 467, 472, 474
 Ediz Hook, 255
 Edmund Point, 427
 Edward, Cape, 471
 Edward Point, 428
 Eel Reef, 418
 Eel River, 207
 Eel River Valley, 223
 Effingham Inlet, 337
 Eggerup Islands, 723
 Egg Island, 525
 Egg Islands, 608
 Egmedio Island, 723
 Egorkovskoi, 509
 Egvekinot Bay, 545
 Ekarma Island, 564
- Elato Island, 762
 Elbow Island and Rocks, 336
 El Coxo, 164
 Eld Island, 246
 Eld's Inlet, 262
 Eleanor Cove, 478
 Elena, Cape and Bay, 41-2
 Elizabeth, Cape, 488, 574
 Elizabeth Islands, 731
 Eliza Dome, 358
 Eliza Island, 711
 Eliza, Port, 356, 357
 El Juco Point, 24
 Elk Bay, 413
 Elk River, 208, 221
 Ella Island, 763
 Ellen Bay, 303
 Ellice Point, 238
 Ellis Point, 241, 459
 Ellis Reef, 667, 686
 Elmore Islands, 730
 El Moro, 159
 El Moro Rock, 174
 El Morro, 94
 Elmstone Rock, 640, 643
 El Muelle Rock, 69
 El Osteonal Rocks, 42
 Elota River, 123
 El Pozo, 26
 Elpynglyn Mountain, 540
 Ellington Point, 486
 El Viejo, 50
 Elwha River, 254
 Emma Harbour, 543
 Emmelagui District, 773
 Emmelian, Cape, 643
 Enderby Islands and Bank, 761
 Endermo Harbour, 655
 Engano, Cabo del, 472
 Engaoughin Bay, 545
 Englefield Bay, 441
 English Bay, 385
 English Harbour, 700
 Eniwetok Islands, 732
 Eno-ura Bay, 623-4
 Ensillada Island, 25
 Enterprise Channel, 323
 Enterprize Reefs, 291, 304
 Entrada Point, 142, 144
 Entrance Bank, 412
 Entrance Head, 603
 Entrance Island, 334, 369, 387
 Entrance Rock, 391
 Entrance Shoal, 283
 Epiphany Bay and Port, 496
 Equatorial Current, North, 935
 Equipalito Rocks, 135
 Eratatai, Cape, 645
 Eremitinos, Los, 777
 Erie Mountain, 278
 Erikub Islands, 723
 Eroon, Cape, 654
 Eroro Islands, 654
 Errakong Island, 775
- Esarmi, Cape, 647
 Escalante Point, 351, 348
 Escape Point, 462
 Escape Reef, 306, 416
 Escape Reefs, 299
 Eschevan Island, 85
 Eschscholtz Islands, 727
 Esclavos Pazas, Rios dos, 72
 Escondido, Puerto, 130, 136
 Escudo de Voragua River, 1
 Escuinlla, 76
 Esarmi Harbour, 655
 Espartel Island, 24
 Esperanza Inlet, 355-357
 Espinoza Arm, 357
 Espiritu Santo Island, 137, 138
 Espuela Island, 20-1
 Esquimalt Harbour, 207, 318, 320
 Esquinas, Rio de las, 32
 Essington, Port, 431
 Estapa, 97
 Estero, The, 37
 Estero Bay, 174
 Estero del Arsenal, 109
 Estero Dona Paula, 50
 Estero Real, 49, 61
 Esteros, Los, 174
 Estevan Point, 347, 365
 Esther Island, 485
 Estiva Island, 15
 Etal Islands, 755, 757
 Etches, Port, 483
 Etelkouium Bay, 545
 Etoline, Cape, 521
 Etoline Harbour, 454
 Eugénie Archipelago, 589
 Euphrosyne Rock, 888
 Eureka, 208
 Faryalus Rock, 600
 Evalouk Islands, 763
 Evans Bay, 408
 Evdokeeff Islands, 501
 Evening Island, 782
 Evson, Cape, 654
 Ewa District and River, 848
 Ewing Harbour, 221
 Ewing Island, 281
 Ewing Peak, 238
 Expedition Bay, 587
 Eyries Mount, 779
- Facpi Point, 799, 801
 Fain Island, West, 762
 Fairfax Point, 297
 Faiu Haven, 849
 Fair Harbour, 361
 Fair of La Paz, 63
 Fairway Channel, 387-8
 Fairway Rock, 530
 Fairweather Mountain and Cape, 465, 471, 476
 Fais Island, 766
 Fakuda Saki, 677
 Palalep Island, 766
 Falcon, Cape, 231
 Falcone Anchorage, 802

mi, Cape, 647
 ante Point, 351, 348
 pe Point, 452
 pe Reef, 300, 416
 pe Reefs, 299
 evan Island, 85
 ascholtz Islands, 727
 avos Pazas, Rios dos, 72
 ndido, Puerto, 130, 136
 do de Veragua River, 1
 iafila, 76
 rmi Harbour, 655
 artel Island, 24
 eranza Inlet, 365-367
 ineza Arm, 357
 iritu Santo Island, 137,
 38
 uela Island, 20-1
 uimault Harbour, 297,
 18, 320
 quinas, Rio de las, 32
 ington, Port, 431
 apa, 97
 tero, The, 37
 tero Bay, 174
 tero del Arsenal, 109
 tero Dona Paula, 50
 tero Real, 49, 61
 teros, Los, 174
 tevan Point, 347, 365
 ther Island, 485
 tiva Island, 15
 tal Islands, 755, 757
 tches, Port, 483
 telkouiun Bay, 545
 toline, Cape, 521
 toline Harbour, 454
 ugénie Archipelago, 689
 uphrosyne Rock, 888
 ureka, 208
 uryalus Rock, 600
 Evalouk Islands, 763
 Evans Bay, 408
 Evdokeeff Islands, 501
 Evening Island, 782
 Evrosn, Cape, 654
 Ewa District and River, 848
 Ewing Harbour, 221
 Ewing Island, 281
 Ewing Peak, 238
 Expedition Bay, 587
 Eyries Mount, 779
 Faepi Point, 799, 801
 Fain Island, West, 762
 Fairfax Point, 297
 Fahu Haven, 849
 Fair Harbour, 361
 Fair of La Paz, 63
 Fairway Channel, 387-8
 Fairway Rock, 530
 Fairweather Mountain and
 Cape, 465, 471, 476
 Fais Island, 766
 Fakuda Saki, 677
 Falalep Island, 766
 Falcon, Cape, 231
 Falcone Anchorage, 802

Falfan River, 14
 Faliao Island, 762
 Falipi Island and Bank, 763
 False Bay, 156, 158, 283,
 398
 False Capstan Head, 896
 False Channel, 357
 False Creek, 385
 False Island, 300
 False Narrows, 317, 390
 Faluclap Island, 765
 Fanadik Island, 760
 Fananou Island, 759
 Fane Island, 291
 Fanning Island, 699
 Funny Bay, 393-4
 Fanopé Island, 743
 Fanshaw Cape, 460-1
 Faoumoupei Island, 743
 Faraguet Island, 779
 Farauls Island, 764
 Faraillesse Island, 765
 Farallone Point, 101
 Farallones, The, 197
 Farallones Alijos, 858
 Farallon Island, S., 191
 Farallon Ingles, 9
 Farallon de Medinilla, 810
 Farallon de Pajaros, 816
 Farallon de Prosper, 22
 Farallon de Torres, 811
 Fararik Island, 763
 Farnham Island, 792
 Farrallones Rocks, 145
 Farroilap Island, 765
 Farugelma Island, 587
 Fatsizio Island, 628
 Fattoilap Island, 765
 Fauntleroy's Rock, 206, 212
 Favidia Island, 401
 Fawn Island, 285
 Fearless Rock, 225
 Fearnsey Point, 403
 Feis Island, 766
 Feklistoff Island, 572
 Felalisse Island, 765
 Felipe, Point, 162
 Fermin Point, 169
 Fern Cove, 261
 Ferrer Point, 354
 Feys Island, 766
 Fiddle Reef, 324
 Fidalgo Island, 267, 278
 Fidalgo, Port, 484
 Finisterra Mountains, 775
 Finlayson Island, 433
 Finlayson Mountain, 277,
 293
 Fin Rock, 222
 Firando, 593, 669
 Fira Sima, 893
 Firmin Point, 167
 Firmin, San, 133
 Fiskard Island and Light,
 318, 320
 Fish River, 581
 Fisher Canal, 428
 Fisher Island, 885
 Fisherman Cove, 430

Fisherman Reef, 617
 Fisherman Rock, 604-5
 Fishing Rocks, 203
 Fitton Bay, 884
 Fitz Island, 355
 Fitzgibbon Point, 451
 Fitzhugh Sound, 426
 Five-fathom Shoal, 325
 Five-finger Island, 390
 Five Hummocks Point, 149
 Flamenco Island, 1
 Flamenco Point, 14
 Flat Bay, 576
 Flat Hill, 239
 Flat Island, 398, 602
 Flat Islands, 401
 Flat Point, 282
 Flat-top Island, 279
 Flat-top Islands, 311, 345
 Flat-top, Mount, 369
 Flat-top Point, 102
 Flattery, Cape, 218, 248,
 252
 Flattery, Cape, and Light,
 316
 Flattery Rocks, 250
 Flinta, Point of, 172
 Flora's Creek, 223
 Florence Shoal, 816
 Flores Island, 345-6
 Flower Island, 357
 Foggy Cape, 449
 Fog Rock, 330
 Folger Island, 817
 Fonseca, 64
 Fonseca, Gulf of, 49, 56, 912
 Ponté Bank, 326
 Foralep Island, 765
 Forbes Island, 340
 Forgade Rock, 892
 Fordyce Pass, 722
 Foreland, N., 492
 Forfana Island, 878
 Formosa, 687
 Formosa, Coast of, 900
 Forrester Island, 458
 Forsyth Point, 437
 Fort Point, 185
 Fortuna, Cape, 206
 Fortune Channel, 344
 Forward Bay, 416
 Forward Inlet, 368-9
 Forwood Channel, 367
 Foster Point, 286
 Foul Bay, 323
 Foul Point, 647
 Foulweather Bluff, 258-9
 Foulweather, Cape, 228-9
 Four-fathoms Bank, 186
 Four-foot Rock, 686
 Four Mountains Islands,
 510
 Fourteen Island Group, 732
 Fox, Cape, 449
 Fox Island, 262, 589
 Fox Islands, 505
 Frailes, Los, 16
 Frailes Rocks, 101-2
 François, Baie des, 471

Francis Island, 711
 Francis Point, 259, 403
 Franklin Bay, 778
 Frazer Island, 317
 Frazer Islands, 751
 Frazer River, 257, 269, 376,
 380
 Frederick Point, 408, 440
 Frederick, Port, 469
 Freeman Point, 581
 Freemantle Point, 485
 Freewill Islands, 781
 French Frigate's Shoal,
 8-1
 Freshwater Bay, 254
 Freshwater Island, 789
 Friday Harbour, 273
 Friendly Cove, 351
 Frio River, 48
 Frost Island, 282-3
 Frost Shoal, 861
 Fruitful Island, 791
 Fuca Strait, Juan de, 251,
 316
 Fuego Volcano, 3, 73-4
 Fuerte, Rio del, and Town,
 123, 125, 126
 Fugur River, 572
 Fukai, 671
 Fukioka, 666
 Fukube Island, 609
 Fukura, 615
 Fuku-ura, 603, 632
 Fukuya, 671
 Fulford Harbour, 297, 302
 Fulford Reef, 325
 Furasato Saki, 686
 Furato Saki, 669
 Fureck, Port, 654
 Fusiyama Mountain, 623,
 636
 Futakami, 668
 Futako Sima, 674, 681
 Futo Saki, 632
 Futsu Saki, 640

Gabilan, 14
 Gabriola Pass and Reefs,
 306, 311
 Gabriola Reefs and Island,
 386, 387
 Galaino Island, 306
 Galera Island, 6, 8
 Galeta, La, 15
 Galiano Island, 301, 304,
 421
 Galley Rock, 339
 Gallina Island, 137
 Gallo Island, 137
 Gallows Point, 388
 Gambley, Cape, 646, 658
 Gambier Island, 400
 Gambier, Point, 462
 Gamble, Port, 264
 Gami, Isla, 27
 Gamova, Cape, 587
 Gamova Point, 588
 Ganges Harbour, 302-3

- Ganges Reef, 677
 Gapan Island, 801
 Garachiné Point, 6
 Garapan, 808
 Garbanos, 817
 Garden Island, 484
 Gardner Canal, 430
 Gardner Island, 765, 863
 Gardner, Mount, 385
 Gardner Point, 459, 464
 Gardner, Port, 266
 Garishka, 527
 Gars Point, 459
 Garova Island, 56
 Garry Point, 381
 Gaspar Island, 791
 Gaspar Rico Islands, 725, 791
 Gaston Bay, 269
 Gauntier Mountains, 779
 Gavareah, Cape, 558, 561
 Gaviota Pass, 163
 Geelwink Bay and Point, 780
 Genkar Nada, 666
 Genkar Sima, 666
 Gensu-gawa River, 660
 Geoffrey, Mount, 393
 George, Point, 239
 Georgia Strait, 274, 305, 308, 377, 391, 397
 Georgia, Gulf of, 267
 Gerald Island, 392
 Germantown Reef, 894
 Ghibu-isi Rock, 633
 Ghijga, Fort, 569
 Ghijnak, and Gulf of, 569
 Giganta, El Cerro de la, 135
 Gig Harbour, 261
 Gihon's Bluff, 210
 Gil Island, 430
 Gila River, 131-2
 Gilbert Island, 715
 Gilbert Archipelago, 694, 706, 940
 Gilbert River, 590
 Gilles Bay, 401
 Gillespy Island, 716
 Giquilisco, 64
 Givry Island, 758
 Glasenapp Road, 540
 Glazenap, Cape, 518
 Glenthorne Creek, 304
 Glimpse Reefs, 323
 Gloubokaia Bay, 513
 Gloubokaia Cove, 509
 Gnaton, 802
 Goat Island, 724, 884
 Goazacoalcos River, 82, 84
 Gobernador Island, 17
 Gold Bluff, 210
 Gold Harbour, 441
 Golden Gate, The, 155, 184
 Golden Horn Bay, 689
 Golden Horn, 617
 Golenichtcheff Cape, 551-2
 Goletas Channel, 420, 421, 422, 425
 Golito, EL, 32
 Golfo Dulce, 29
 Golovatcheff or Golovachef, Cape, 574, 584
 Golovnine Bay, 526
 Golownin Strait, 564
 Goly Island, 507
 Gomez Island, 117
 Gongo Sima, 606
 Gonzales, 8
 Gonzales Point, 324
 Gooch Island, 297
 Good Hope, Bay of, 654
 Good Look-out Islands, 772
 Good News Bay, 522
 Goose Island, 278
 Goosac Spit, 395
 Gorbun Rock, 494
 Gorda Point, 9, 21, 40-1
 Gorda, Punta, 30, 139, 206
 Gordon Group, 421
 Gordon Head, 289
 Gordon Islands, 423
 Gordon Point, 418
 Gordon River, 316
 Gore Island, 131
 Gore Island, and Cape, 531, 532
 Gore Point, 488
 Goreli Island, 511
 Goreloy Island, 514
 Gorge Harbour, 407
 Gussip Island, 305
 Goten Yama, 642
 Gotenyama Hills, 644
 Goto Cape, 672
 Goto Islands, 671
 Goulding Harbour, 471
 Goulon Islands, 769
 Governor Rock, 297
 Govenskoï, Cape, 647
 Gower Point, 399, 490
 Gowland Harbour and Island, 411
 Gowland Rocks, 341
 Goza Inlet, 621
 Grace, Point, 486
 Graham Bluff, 643
 Graham, Cape, 99, 100
 Graham Harbour, 489
 Graham Island, 437, 440
 Grajero Point, 150
 Grampus Islands, 877
 Granada, 48
 Granada, Lake of, 47
 Granada River, 34
 Grande, River, 14
 Grande, Rio, 29, 204
 Granite Island, 363
 Granite Point, 413
 Grantley Harbour, 528
 Grappler Creek, 329
 Grappler Reef, 301, 308
 Gravel Spit, 283
 Grave Point, 299
 Graves, Port, 399, 400
 Gravina Island, 450, 452
 Gravina, Port, 484
 Gray Feather Bank, 760
 Gray's Bay, 235
 Gray's Harbour, 245-6
 Great Bank, 338
 Great Lu-chu Island, 895
 Green Bank, 286
 Green Cove, 331
 Green Hill, 831
 Green Island, 486, 488, 868
 Green Point, 241, 292
 Greenwich Island, 753
 Gregory, Cape, 224, 226
 Greig Cape, 520, 645
 Grenville Canal, 430
 Grenville Cape, 231
 Grenville Point, 242, 248
 Greville Cape, 496
 Grey Point, 380, 385
 Grey Rock, 392, 423
 Griffin Bay, 278
 Grief Point, 405
 Grifo Island, 92, 93
 Grifo Point, 94
 Grigan Island, 794, 814
 Grimes Island, 766
 Grindall Point, 453
 Grottes, Pointe des, 810
 Guadalupe Island, 858
 Guadalupe, Baya de, 472
 Guahan Island, 794, 797
 Guajan Island, 797
 Guam Island, 797
 Guanaacaste, 26, 43
 Guanavano, 26
 Guapilon Point, 34
 Guaquina Arm, 353
 Guarida Point, 20, 21
 Guasacamec Point, 911
 Guatemala, 2
 Guatemala, Coast of, 76
 Guatemala, Mountain of, 74
 Guatemala, Republic of, 72
 Guatemala, Volcano of, 67
 Guatlan, 104
 Guatulco, 85, 88, 89
 Guaymas, 80, 82, 111, 126
 Guaymas River, 138
 Guaymas, Port, 122
 Guayaquil River, 911
 Gueguensi Island, 58
 Guemes Island, 267
 Guere Mountain, 745
 Guerin Gulf, 588
 Guguan Island, 812
 Guibert, Cape, 657
 Guichicovi Mountains, 84
 Guide Islands, 407
 Guinea, North Coast of, New, 777
 Guionas, Cape, 39, 40
 Guiranas, Punta de, 156
 Gun Cliff, 646
 Gunnor Harbour, 345
 Gurguan Point, 807
 Guyamas River, 172
 Guy Rock, 816
 Hachken Gawa River, 616
 Hadagase, 675
 Haddington Island, 418
 Haddington, Port, 900, 902

our, 245-6
 338
 nu Island, 895
 k, 286
 k, 331
 831
 nd, 486, 488, 868
 t, 241, 292
 Island, 753
 Cape, 224, 226
 520, 646
 Canal, 430
 Cape, 231
 Point, 242, 248
 ape, 496
 t, 380, 385
 t, 392, 423
 y, 278
 t, 405
 nd, 92, 93
 nt, 94
 land, 794, 814
 land, 766
 Point, 453
 Pointe des, 810
 e I-land, 858
 ca, Baya de, 472
 Island, 794, 797
 land, 797
 ste, 25, 43
 ano, 25
 Point, 34
 a Arm, 353
 Point 20, 21
 ner Point, 911
 ala, 2
 ala, Coast of, 76
 ala, Mountain of, 74
 ala, Republic of, 72
 ala, Volcano of, 67
 a, 104
 co, 85, 88, 89
 as, 80, 82, 111, 126
 as River, 138
 as, Port, 122
 as, River, 911
 quill River, 58
 ensi Island, 58
 Island, 267
 ce Mountain, 745
 Gulf, 588
 an Island, 812
 rt, Cape, 657
 icovi Mountains, 84
 Islands, 407
 a, North Coast of,
 w, 777
 as, Cape, 39, 40
 mas, Punta de, 156
 Cliff, 646
 or Harbour, 345
 uan Point, 807
 mas River, 172
 Rock, 816
 ken Gawa River, 616
 agase, 675
 ington Island, 418
 ington, Port, 900, 902

Hadehi Bay, 581
 Haida Point, 286
 Hagemeister Island, 521
 Hahainish Harbour, 265
 Hakodadi or Hakodate Har-
 bour, 634, 648, 649
 Hakodate Head, 645, 647
 Hakosaki Bay, 666
 Hakubo Island, 607
 Halawa Point, 845
 Halcyon Island, 792
 Halelca Bay, 854
 Halezof, Cape, 584
 Half Moon Bay, 180
 Half Tide Rock, 278, 283,
 343
 Halgan, Cape, 543
 Halibut Channel, 362
 Halibut Island and Head,
 503
 Hall Island, 307, 309, 715,
 758
 Hallows Island, 672
 Hamana, 621
 Hamilton Point, 903
 Hammersley's Inlet, 262
 Hamo Bay, 603
 Hammond Rocks, 316
 Hamond, Cape, 482
 Hanadi Island, 899
 Hanalaa Bay, 854
 Hanamura Bay, 609
 Hanapepe Valley, 853
 Hand Island, 339
 Hankin Point, 286
 Hankin Rock, 344
 Hans Olsen Harbour, 655
 Hanson Island, 417
 Hanson Point, 245
 Harbour Island, 331, 357,
 358, 589, 668, 893
 Harbour Point, 100
 Harbour Rock, 278, 286
 Harbottle Island, 714
 Hardy Bay, 420
 Hardy Island, 367, 404
 Hardy Harbour, 671
 Hardywicke Island, 414, 415
 Harida nada, 601
 Earima nada, 609, 610
 Harney Channel, 286
 Haro Archipelago, 251, 272,
 273
 Haro, Cape, 127
 Haro Strait, Directions, 288
 Haro Strait, 279, 287, 294,
 325, 326, 377
 Harriet Point, 491
 Harrington Point, 455
 Harris Point, 459
 Harrison River, 376, 382
 Harry Point, 297
 Harvey, Port, 415, 416
 Harwood Island, 405
 Hasedasinose Bank, 610
 Hashmy Islands, 757
 Hasikiwi, 620
 Hasikiwi Anchorage, 619
 Ha Sima, 632

Hasyokan Island, 901
 Hatch Point, 297
 Hat I land, 364
 Hato saki, 668, 686
 Haula Bay, 847
 Haumilulu, 86
 Havannah Channel, 416
 Haven's Anchorage, 293
 Hawaii Island, 819, 826
 Haweis Island, 762
 Hawkesbury Island, 429
 Hawkins Island, 304, 484
 Haya saki, 681
 Haycock Bluff, 641
 Haycock Islands, 425
 Haystack Rock, 632
 Haystacks, The, 364
 Haystrous Island, 791
 Hazama Mountain, 639
 Hazel Point, 265
 Hazy Islands, 464
 Head Bay, 353
 Heakakaka Point, 833
 Healsburgh, 202
 Hebi Sima, 892
 Hecate Channel, 357
 Hecate Cove, 371
 Hecate Pass and Bay, 325,
 334, 343, 347
 Hecate Rock, 424
 Heceta Bank, 227
 Heceta's Inlet, 216
 Heda Bay, 623-24
 Hecia, 847
 Hekgosi, 605
 Helby Island, 329, 330, 333
 Helen Point, 291, 304
 Helen Reef, 782
 Hele Rock, 898
 Heliaghyn Bay, 538
 Helmoken Island, 414, 415,
 417
 Helsen Island, 792
 Helut Islands, 730
 Helvetia, New, 153
 Hemming Bay, 487
 Hemslung Cove, 440
 Henderson's Inlet, 262
 Henderson Island, 859
 Henderville Island, 707,
 713
 Henry Bay, 393-4
 Henry, Cape, 442
 Henry Island, 288, 293, 441
 Henry Islands, 293
 Herbert Arm, 347
 Herbert Island, 898
 Hernandez Island, 405-6
 Hermanos Islands, 116
 Hermanos Rocks, 14
 Hermits Islands, 777
 Hermoso, Morro, 39, 147
 Hermosilla, 123
 Hermosa Point and Bay,
 17
 Hernandez Island, 409
 Herradura Island and Port,
 35
 Herron Island, 24

Hesquiat Harbour & Bluff
 347-8
 Hoy Point, 482
 Hicarita Island, 19
 Hicaron, 17, 19
 Hida ka kawa River, 617
 Hielap Island, 767
 Higgins Point, 452
 Highest Island, 359
 High Island, 766
 Highfield Point, 454
 Highwater Rock, 286
 Hiku Sima, 602, 608, 670,
 685
 Hill Island, 329, 330, 335,
 338, 408, 471, 666
 Hill Rock Shoal, 17
 Hilo, 825, 829
 Hilo and Bay, 828
 Hillsborough Island, 885
 Himo Sima, 606, 666, 673
 Hinchinbrook Island, 483
 Hino Misaki, 617, 619
 Hino yama, 617
 Higo, 610
 Higo Mountains, 610
 Higo, Port, 612
 Hippa Island, 440
 Hirado Id., 668, 669, 670
 Hirase Rock, 673
 Hira Sima, 670
 Hirowatali Bay, 616
 Hishiwo Bank, 677
 Hi Sima, 674
 Hitango Sima, 672
 Hitsou, Cape, 505
 Hive Rock, 621
 Hoa-pin-su Island, 904
 Hobart, Point, 461
 Hobbs Island, 342, 347
 Hodge Rock, 671
 Hogan Island, 471
 Hogolen Islands, 757
 Ho-hoe Island, 360
 Holdsworth, Mount, 417
 Hole-in-the-Wall, 348
 Holkham Bay, 462
 Holland Island, 705
 Holland Point, 322
 Holy Cross Bay, 541, 544
 Homalko River, 409, 410
 Home Island, 400
 Hono-ura, 667
 Hondobin Bay, 519
 Honduras, 56
 Honolulu, 847, 849
 Honoonono, 849
 Hooch River, 249
 Hood Bay, 464
 Hood's Canal, 218, 258
 Hood's Canal and Head,
 264
 Hood, Mount, 242
 Hood Point, 399
 Hope, Town of, 380, 381
 Hope Island, 422, 710
 Hope Point, 401
 Hopkins Point, 430
 Hopper Island, 707, 714

- Hoquiamts River, 247
 Horino-utsi-mura Bay, 638
 Hornby Island, 391, 393
 Horner, Cape, 574
 Horner Peak, 598
 Horuet Bay, 589
 Horse-shoe Bay, 299
 Hoskyn Inlet, 408
 Houghton, Port, 461
 Hounlodgna Bay, 803
 Houston Island, 283
 Houston Pass, 301, 307
 Houston Stewart Channel, 436
 Howe, Point, 455
 Howe Sound, 385, 398, 400
 Howland Island, 705
 Huahualai, 835
 Huaurari, Mount, 827
 Huazotlan, 84
 Hudson Island, 300
 Hudson Point, 257
 Hueneme Point, 161
 Hugh, Point, 462
 Hugon, Cape, 587
 Huko Sima, 671
 Hulah Rocks, 275
 Hull Island, 416
 Humoldt Bay, 207, 779
 Hummock Island, 900
 Hump Island, 781
 Humtolape River, 247
 Hungry Rock, 675
 Hunter Island, 731
 Hunter Reef, 769
 Hunt Point, 431
 Hurd's Island, 710
 Huret Island, 423
 Hurtado Point, 405
 Hyacintho Bay, 408
 Hyakfukung, 607
 Ianthy Shoal, 763
 Ibargoitia Island, 761
 Ibeeso, 659
 Ibbetson Islands, 722
 Ibbetson, Cape, 431, 443
 Iccos Point, 62
 Ichey Island, 899
 Ichiokashinden, 612
 Iey Bay, 479
 Iey Ocean, 499
 Idol Island, 301
 Idragne River, 34
 Idau, Cape, 633, 636
 Idau Peninsula, 594, 622, 632
 Ifalik Islands, 763
 Igama Bay, 665
 Igama Island, 16
 Igatskoy Bay, 495
 Ighakehi Bay, 495
 Igna-look Island, 630
 Iguana Point, 9
 Ikatok Island, 504
 Ikatun Island, 504
 Iki Island, 665, 667
 Ikop Island, 759
 Ikutski Island, 668
 Ilenao, 13
 Iliaminsk Peak, 491
 Ilibe Saki, 617, 618
 Ilic, 801
 Ilic Bay, 802
 Illak Island, 515
 Illinois River, 212
 Illuluk Bay and Port, 508
 Ilpinak, Cape, 550
 Ilpinski, Cape, 547, 552
 Imak Island, 518
 Imari Bay, 668
 Imillia Island, 775
 Imoshiri Island, 654
 Imperial, Port, 581
 Imperieuse Bluff, 638
 Inago Mountain, 799
 Inaki Sima, 609
 Ina Minato, 667
 Indian Island, 208, 309, 345, 422
 Indian Point, 286
 Ingakoadak Bay, 509
 Ingersoll Patches, 897
 Ingersoll Rocks, 892
 Inglesse, Morro, 128
 Inglis Rocks, Lady, 621
 Ingoda River, 584
 Ino Sima Mountain, 637
 In Sima, 607
 Inskip Channel, 441
 Inskip Islands, 320
 Inskip Rocks, 320
 Intrusa Island, 24
 Intrusa Rock, 23
 Invincible Point, 133, 439
 Irako-saki, 621
 Irons Shoal, 761
 Iro-o Saki, 633
 Isabel Island, 112
 Isabel, Mount, 142
 Isabella Reef, 754
 Isaki, 604
 Isaki Point, 618
 Isalco Volcano, 3, 70-1
 Isanotskoy, Strait of, 504, 618
 Isima, 615
 Island, The, 167
 Island Cove, 345
 Island Harbour, 335-6
 Islands, Bay of, 467
 Islet Point, 589
 Isletes Group, 32
 Ismenai and Bay, 556, 558
 Isonusu, 661
 Issannakh Mountains, 506
 Istapa, 3, 30, 69, 72-3
 Istmo, Islas del, 6
 Isumi Strait, 610, 613, 616, 619
 Isumi nada, 601, 610
 Isumo saki, 619, 620
 Itobasco, 65
 Itopango Lake, 66
 Itsha River, 568
 Itshinsk, 569
 Itshino Sima, 619
 Itshive Misaki, 618, 619
 Ittigran Island, 539, 540
 Iturbide, 2
 Itunup Island, 562, 566
 Iwana Sima, 605
 Iwogo Sima, 801
 Iwo Sima, 673, 677, 679, 894
 Iyo, Cape, 608
 Iyo nada, 601, 606
 Izanbek and Bay, 518
 Iztapan, 73
 Jabali, Cape, 20
 Jabwat Island, 729
 Jackson Point, 528
 Jacobi Island, 467
 Jaluit Islands, 730, 731
 James Bay, 304
 James, Cape, 422
 James Island, 275, 294-5
 James Point, 298
 Jane Island, 753, 791
 Japan (Winds), 921
 Japan, Climate, &c., 594
 Japan, Inland Sea of, 601
 Japan, S.E. Coast, 635
 Japanese Archipelago, 593, 687
 Japanese Current, 687
 Jardines, Los, 793
 Jarvis Island, 697
 Jeannette Island, 630
 Jecoits or Jekoits Island, 746, 749
 Jefferson Point, 259
 Jemmy Jones Islet, 326
 Jemo Island, 724
 Jenkins Island, 401
 Jennie Point, 278, 281
 Jequepa Point, 96
 Jerabout Island, 892
 Jervis Inlet, 402, 404, 409
 Jessc Island, 562, 653
 Jessc Island and Strait, 567
 Jiboa River, 66
 Jijiginak, Fort, 569
 Jiquilisco, 64
 Joann Bogosloff Island, 510
 Jobie Island, 780
 John Begg Rock, 168
 John, Port, 428
 John's Island, 291
 John's River, 246
 Johnstone Strait, 413, 414
 Johnstone Reef, 289
 Johnston Islands, 790
 Johnston Rock, 615
 Joka Sima, 638, 675
 Jonas Island, 572
 Jones Island, 279, 295
 Jonquiere Bay, 574, 583
 Joquoits Island, 749
 Jordan River, 317
 Jorvaco River, 125
 Jorullo Volcan de, 97
 Joupanoff Volcano, 554
 Juan de Fuca Str.a.t., 251, 315, 316
 Juanilla Island, 42

1, 539, 540
562, 566
565
591
73, 677, 679,
s
606
Bay, 518
20
d, 729
, 528
, 467
s, 730, 731
04
422
275, 294-5
298
753, 791
(s), 921
ate, &c., 594
d Sea of, 601
Coast, 635
chipelago, 593,
rrrent, 687
s, 793
i, 697
land, 630
Jekoits Island,
oint, 259
es Islet, 326
1, 724
and, 401
t, 278, 281
int, 96
land, 892
t, 402, 404, 409
d, 562, 653
d and Strait, 567
t, 66
ort, 569
64
osloff Island, 510
nd, 780
y Rock, 168
z, 428
and, 291
ver, 246
Strait, 413, 414
Reef, 289
Islands, 790
Rock, 615
a, 638, 675
nd, 572
nd, 279, 295
Bay, 574, 583
Island, 749
iver, 317
iver, 125
olcan de, 97
Volcano, 554
Fuca Strait, 251,
6
Island, 42

Juan Rodriguez Island, 170,
171
Juchitan, 83
Juco Point, 25
Judas, Cape, 142
Julia Island, 306
Julie Island, 891
Julo Island, 895
Junction Passage, 335
Junction Point, 406
Junk Harbour, 898
Kaalaen, 847
Kabaha Island, 728
Kaba Sima, 668, 671, 674
Kabasima Bay, 680
Kabuto yama, 664
Kadoolawe, 844
Kado Sima, 665
Kadsusa Bay, 644
Kadzitori Point, 606, 608
Kagalah, 631
Kaena, Cape, 846
Kaena Point, 848
Kagai Island, 502
Kagara, 667
Kageno, 675
Kagosima and Gulf, 599
Kagu Channel, 671
Kahiki, Cape, 841
Kah-la-wat-set River, 227
Kahoolawe or Kahulaui,
844
Kaigan Harbour, 458
Kailau and District, 836
Kakana Bay, 847
Kakhalga Island, 515
Kakisaki, 634
Kakooa, 838
Kalakhtyrka River, 555
Kalegha, Cape and Bay,
508-7
Kalishka, 527
Kaluaaha, 845
Kalulak River, 521
Kama Islands, 766
Kamalaea Bay, 843
Kamennaiia Pristan, 527
Kamenuoi, Cape, 526
Kame ura Harbour, 681
Kamida Creek, 649
Kani Idzumi, 667
Kaminoi, 569
Kaminoue Islet, 893
Kamino Kosiko, 651
Kaminoseki, 606
Kunino Sima, 675
Kamoda-saki, 615
Kunome Sima, 681
Kamchatka, 561, 920
Kamchatka Peninsula, 547,
550
Kamchatka River, 551,
553
Kamchatka, Sea of, 518
Kamchatskoi, Cape, 553
Kanaga Island, 514

Kanagawa, 641
Kanakiki, 828
Kanawa Rock, 628
Kanaya Point, 633, 644
Kanoda Bay, 640
Kanoga saki, 666
Kaneote, 847
Kaneote, 846
Kanghynin Bay, 545
Kanon saki, 639, 640, 641,
642
Kansano yama, 617
Kanzu Island, 604
Kaouai River, 230
Kapaho Point, 828
Kapenour Island, 751
Kapenuare Island, 751
Kapoho Point, 840
Karaga River, 552
Karaghinskaia Bay, 552
Karaghinsky Island, 551
Karakakooa District & Bay,
837
Karamo Islands, 616
Karassuka Island, 599
Kareki Island, 686
Karlouk, 496
Kasato Island, 606
Kassatotchy Island, 513
Kata, 614
Kuta Island, 761
Katalamet Mountains, 240
Katelina Island, 751
Kuter Island, 879, 880
Katona Sima, 894
Katsura saki, 666
Kattou Island, 773
Katzmota ura, 667
Kauai or Kau Island, 823,
824
Kau District, 825, 839
Kaula Island, 856
Kaulaka Passage, 555
Kawuihae and Bay, 825,
834
Kawailoa Bay, 847
Kawa Saki, 642
Kawatch, 670
Kawatchi, 686
Kaye Island, 482
Kealaikahiki Shoal, 844
Kealukokua District & Bay,
836
Keats Island, 400
Kellett Bluff, 288, 293
Kellett Island and Ledge,
275
Kelly Island, 886
Kelp Bar, 395
Kelp Bay, 329
Kelp Island, 340
Kelp Reefs, 287-8
Konay Bay, 919
Ken. y Peninsula, 489
Kendrick Arm, 351
Kendrick Island, 890
Kennedy Island, 441
Keppet, Cape, 298

Keraghinsky Island, Little,
547
Kerama Islands, 895, 897
Ketchechnoi, 509
Ketoy Island, 565
Keyhole, The, 184
Khabaroff, Cape, 573
Khalnetkin, Cape, 538
Kharumukotan Island, 564
Khalap Island, 767
Khing-khan Mountains, 584
Khitroff, Cape, 548
Khrantschenko Bay, 521
Kibatsu Bay, 676
Kibune Point, 603
Kidd Island, 879
Kidd or Plymouth Id., 885
Kigalga Island, 506
Kikai Sima, 894
Kiku Strait, 459
Kilauea, Mount, 825, 828
Kili Island, 731
Killiliak Bay, 508
Kiloudenskoy Bay, 496
Kiluden Bay, 496
Kiludenskoy Bay, 496
King, Cape, 546, 645
King George Archipelago,
469
King George's Sound, 348
Kinghorn Island, 406
King Island, 329, 333, 427,
428, 527
King Islands, 290
Kingman Reef, 703
Kingsmill Islands, 707
Kingsmill Point, 459
King William, Cape, 778
Kio Sima, 607
Kiraueah Volcano, 828
Kirilovskaia Bay, 515
Kirime yama, 617
Kishu Ngawa River, 612
Kishungawa River, 611
Kisi Post, 585
Kiska Island, 504, 516
Kitagotagh Island, 503
Kitenamagan Island, 504
Kithouk, Cape, 505
Kiti District, 745
Kiti River, 748
Kittlitz Point, 746
Kiunutanany Island, 502
Kiusiu Island, 597
Kiusiu Strait, 666
Kiahloh Rock, 254
Klamath River, 211
Klaproth Point, 587
Klaskino Inlet, 365
Klaskish Inlet, 365
Kliavakhan, 458
Kliuchevsk, 554
Klokacheva Sound, 469
Klokatcheff, Cape, 575
Klooueh Rock, 223
Kloster-camp, 582
Klutevskoi Volcano, 512,
551, 553, 554

Klutchi, 554
 Knapp Island, 295
 Knight Inlet, 416
 Knight Island, 478, 486
 Knocker Rocks, 13
 Knorr Island, 881
 Knox Bay, 414
 Knoy Island, 707, 716
 Ko-adjiro Bay, 638
 Koarra District, 835
 Koassoff Island, 572
 Kobe Bay and Point, 612
 Kodiak, 446, 496
 Kodiak Archipelago, 493, 494
 Kodiak Island, 919
 Kodo-kopuei Island, 784
 Kodota-yama, 660
 Kodsine Island, 628
 Ko-futakami Rock, 668
 Kohala and District, 834
 Kohebi Sima, 892
 Koikla Point, 253
 Koko Sima, 602
 Kok-shittle Arm, 361
 Kokura and Ledge, 603
 Koloa Point, 853
 Kolo Point, 853
 Koloschensk Archipelago, 449
 Kolui Point, 836
 Komandoraki Islands, 548
 Komox District, 393
 Konabuse Rock, 604
 Kora District, 836
 Kona Peak, 853
 Kongelab Islands, 726
 Kongotes, 428
 Kougouan, Cape, 540
 Koning Willem III. Island, 629
 Konniaga Island, 514
 Konohaunui Mountains, 846
 Koolau, 847
 Koosilvac River, 523
 Koos River, Bay, and Head, 224-5
 Koprino Harbour, 370-1
 Korack Islands, 772
 Korai Strait, 597
 Korea Strait, 665, 684
 Korovinskua, Cape & Bay, 513
 Korovinskua Harbour, 513
 Korovinskoi Volcano, 612
 Korsakov Islands, 588
 Kosaka Channel, 671
 Kosedo, 676
 Kosiki Islands, 681
 Ko-sima, 608, 652, 656
 Kosime no oo sima, 665
 Kossol Island, 773
 Kossii, 606
 Kossu Sima, 626
 Kotaka Island, 607
 Kotako Sima, 673
 Kotovy Islands, 533
 Kotsi Inlet, 601

Kotau Sima, 665
 Kotzbomura, 638
 Kou Island, 456
 Kouganga Island, 505-6
 Kougounan, Cape, 639
 Kouvaem River, 543
 Kourakong Island, 775
 Kouro Saki, 614
 Kouskoquim River, 522
 Koutchougoumut, 620
 Koutouzoff, Cape, 619
 Koutznou, 464
 Kouzmichtcheff, Cape, 552
 Kowroa Point, 836
 Kowrowa, 838
 Koyaki Island, 673, 675, 677
 Koza-gawa, 620
 Krachenninikoff, Cape, 552
 Krafio River, 573
 Krenitzin Bay, 504
 Krenitzen, Cape, 564
 Krenitzin Islands, 506
 Krenitzin Point, 518
 Kritskoi Island, 518, 519
 Krlougoun, Cape, 536
 Kronotskoi, Cape, 554
 Kronotskoi Volcano, 554
 Krusenstern Cove, 545
 Krusenstern Island, 530
 Krusenstern Islands, 724
 Krusenstern Rock, 874
 Kruzoff Island, 467, 472
 Kryci Islands, 505, 515
 Kii Channel, 601, 610, 614
 Kuchtui River, 670
 Kudaka Island, 899
 Kudai Island, 608
 Kuegdogh Island, 503
 Kuga Channel, 671
 Kuhushan Point, 397
 Kui Island, 898
 Ku-kien-san Islands, 900
 Kula District, 841
 Kulauloa District, 846
 Kumi Head, 897
 Kumi Island, 899
 Kuminasi sima, 606
 Kuna Siri Island, 567
 Kunashiri Island, 562, 567
 Kuper Island, 300, 301, 306, 309
 Kuper, Port, 441
 Kuprianoff Island, 456
 Kura Sima, 616
 Kuria Island, 710, 714
 Kurilo Archipelago, 550, 562
 Ku-ri-mah Island, 900
 Kuro-ko Sima, 686
 Kurose Rocks, 674
 Kurosegawa, 687
 Kuro Sima, 670, 892
 Kuro Siwo Current, 597, 687
 Kusaie Island, 719, 739, 741
 Kusa-kaki, 682
 Kusaya, 666
 Kushnon, 464

Kusimoto, 620
 Kusi Saki, 604
 Kuskowime River, 521
 Kutenose Rock, 674
 Kutsino Sima, 892
 Kutusoff Cape and Bay, 666
 Kutusoff Islands, 725
 Kvichak River, 521
 Kwadelen Islands, 728
 Kwajalein Islands, 758
 Kwich-pak River, 523
 Kyangle Island, 772
 Kyghynin, Cape, 540
 Kyli Islands, 730
 Kyo Island, 775
 Kynkai Island, 541
 Kyuquot Sound & Channel, 359, 362
 Kyoko Island, 899
 Kysi Lake, 582
 Lachsforellen Bay, 577
 Ladrone Islands, 28, 708, 785, 793
 Ladrone Islands, Climate, 796
 Ladrone Islands, Winds, 923
 Lady Blackwood Pass., 758
 Lae Islands, 729
 Lagediak Strait, 724
 Laguna Grande, Punta del, 87
 Laguna Grande, Morro de la, 46
 Laguna Point, 161
 Lahaina, 825, 842
 Lajas River, 46
 La Libertad, 130
 Lalo Point, 807
 Lambert Channel, 391, 393, 395
 Lambert Islands, 730
 Lambert, Point, 431
 Lamoliaour Islands, West, 769
 Lamoliork Islands, 769
 Lamotrek Island, 762
 Lampa River, 65
 Lanai Island, 844
 Lane Cane Mountain, 363
 Langaligaraile Island, 765
 Langford, Port, 355
 Langley, 381
 Langley, New, 384
 Lanz Island, 425
 Laomira Island, 875
 La Paz Bank, 761
 La Paz and Bay, 137
 La Paz Bay, 80
 Lapelin Rocks, 852
 La Playa, 157
 La Playeta de Chiguirin, 62
 Larkins Reef, 754
 Larn Rocks, 892
 Lusan Rys Island, 866
 Laskar Island and Reef, 866

20
04
River, 521
ock, 674
a, 892
ape and Bay,
lands, 725
ver, 521
lands, 728
lands, 758
River, 523
land, 772
Cape, 640
s, 730
d, 775
land, 641
ound & Channel,
and, 899
, 582
len Bay, 577
lands, 28, 708,
Islands, Climate,
Islands, Winds,
ockwood Pass., 758
ads, 729
Strait, 724
Grande, Punta del,
Grande, Morro de la
Point, 161
, 825, 842
ver, 46
rtad, 130
int, 807
t Channel, 391, 393,
t Islands, 730
t, Point, 431
our Islands, West,
ork Islands, 769
rek Island, 762
River, 65
Island, 844
Cane Mountain, 363
ligaralle Island, 765
ord, Port, 355
ey, 381
ey, New, 384
Island, 425
ira Island, 875
az Bank, 761
az and Bay, 137
az Bay, 80
lin Rocks, 852
aya, 157
layeta de Chiguirin, 62
ins Reef, 754
e Rocks, 892
n Rys Island, 866
ar Island and Reef,
6

Lasqueti Island, 391, 401
Lassiano Island, 866
Lassion Island, 865
Latouche Island, 486
Latouche Point, 478
Latsop River, 247
Laupahoi, 833
Laura Point, 305
Lauretanec, Mar, 122
Lausen Point, 158
Lavandera Rock, 26
Lavenia, Rio, 21
La Ventosa, Morro of, 84
Lavinia Point, 469
Lawn Point, 367
Lawrence Islands, 343
Lawrence Point, 276, 285
Lawson Bluff, 281
Lawson Rock, 283
Laxa Rock, 115
Laxman Bay, 654
Laysan Island, 864
Lazaref, Cape, 580, 584, 586
Lazaro, Cape, 144
Lazo, Cape, 391, 396
Leadbetter Point, 242
Leading Bluff, 330, 333,
335
Leading Cone, 366
Lealu Hill, 850
Leading-in-Cliff, 241
Leading Island, 360, 362
Leading Mountain, 357
Leading Point, 325, 341
Lebedevski Islands, 533
L'Echiquier Islands, 776
Ledge Point, 417, 418
Ledianaya River, 543
Leech Island, 369
Lee Rock, 324
Leca, Point, 451
Legamo Bay, 20
Legarde Rock, 859
Legiep Islands, 724
Lehua Island, 856
Lelé, Port, 741
Leléwi Point, 829
Lemon Mountain, 421
Lemon Point, 8
Lempa River, 3, 63, 65, 66
Leonates Islands, 28
Lengua Point, 142
Leon, 43
Leonard Island, 342
Leon Lake, 3, 48, 49
Leones Island, 17
Leontovitch, Cape, 518
Leskoff, Cape, 518
Lesseps, Cape, 562
Lewis Channel, 406
Lewis Reef, 324
Lexington Reef, 897
Lialuskigh, 503
Liberia, 29
Liberiad, Port, 2, 3, 63, 64,
66
Lib Island, 730
Liddel Point, 302, 304-5
Lilib Islands, 724

Lileb Island, 728
Lilvet Lakes, 404
Limantour Estero de, 196,
199
Limestone Island, 371, 413
Lime Point Bluff, 187, 189
Limestone Point, 333
Linda Rock, 888
Lindsay Island, 816
Lindsay, Port, 668
Linekinsky, Cape, 573
Linglingai Mountain, 545
Linnez Islands, 732
Linschoten Islands, 892
Lisiansky Island, 865
Little Goat Island, 884
Little Group, The, 295
Little Hat Rock, 134
Livingston Island, 759
Lizard Point, 97, 98
Llorona Pta., 33
Lloretto, 135
Lloyd, Port, 879, 882
Lobos Island, 134, 875
Lobos Point, 126, 175, 186
Lod Harbour, 749
Loffzoff Cape, 567
Logo River, 641
Log Point, 370
Loma, Point, 151, 156, 167
Lone Cone, 343, 347
Long Bay, 341
Long Harbour, 303
Long Island, 245, 281, 777,
781
Longounor Island, 756
Loo-choo Islands, 893
Lookout Cape, 218, 229, 231
Lookout Island, 362-3
Lopatka, Cape, 551, 561, 568
Lopez Island, 267, 273, 274,
281
Lopez Island and Sound,
282
Lord Island, 355
Lord North Island, 782, 784
Lorenzo Point, 6
Loreto, 135, 153
Loreto, Gulf or Sea of, 122
Losap Island, 755
Los Martires Island, 760
Los Remedios, 24
Lottin Island, 777
Lottin, Port, 740
Lot's Wife Rock, 630
Louisappe Island, 755
Louisa, Cape, 657, 664
Louiscon, 443
Louis, Port, 587-8
Lowenorn, Cape, 577
Lüwenstern, Cape, 575
Low, Cape, 581
Low Island, 284, 288, 295,
646
Low Peninsula, 342
Low Point, 242
Low Table Point, 590
Low Woody Islands, 697
Lucan Point, 469

Lu-chu, Great, 898
Lu-chu Islands, 687, 893
Ludlow, Port, 264
Lugren, 538
Luis Harbour, 797
Luké Point, 592
Lukunor Island, 755
Luminan Reefs, 800
Lummi Island, 269, 276
Lungar Point, 746
Luta Island, 803
Lütke, Cape, 505
Lütke Island, 759
Lyall Harbour, 290
Lyall Point, 339
Lydia Island, 762
Lydia Islands, 728
Lynn Canal, 461, 465
Lyons River, 589
Lyre River, 254
Ly Hon, City of, 381

Macapule River, 124
Macarius Island, 531
Macartney Point, 460
MacAskill Islands, 742
Macauley Point, 322
Macedonia Reef, 537-8
Machaguaista, 85
Mackaw Reef, 741
Mackenzie Islands, 766
Mackenzie Point, 492
Mackerrey, 843
MacLaughlin Point, 322
Macnamara Point, 455
Macroon Hill, 439
Madan Point, 454
Mad River, 209
Madara Sima, 668
Madeira Volcano, 45
Madera, 48
Madison, Port, 259
Madre Sierra, 71, 83
Magdalena, 105
Magdalena Bay and Gulf,
141
Magdalena Islands, 143
Maghyr Island, 760
Maghyrrik Island, 760
Magicienne Bay, 8, 809
Maglares Point, 135
Magnetic Island, 22, 24
MAGNETIC VARIATION, 952
Mahilone Hill, 803
Maiana Island, 715
Majaguay Island, 9
Mauro Island, 721
Makahamaloa Point, 829
Makanuru Island, 565
Makapua Cape, 846
Makin Island, 708, 717
Makouchinskoy Bay, 508
Makua Bay, 847
Mula brigas Islands, 877
Mala, Cape, 6, 16
Malackan Island, Peak, and
Harbour, 773-4
Mala de los Indios, Pta, 34

- Mala Point, 34, 41
 Mala, Punta, 912
 Malaspina Cape, 666
 Malaspina, Strait and Inlet, 391, 401, 402, 405
 Malay, Cape, 16
 Malcolm Island, 417, 418
 Malcone's Island, 791
 Malden Island, 699
 Malkoep Inlet, 363
 Malloon's Island, 791
 Malmesbury, Port, 469
 Maloelab Islands, 722
 Malpelo Island, 694
 Malte Brun Point, 687
 Mamori, Cape, 781
 Managasa Island, 808
 Managua, Lake, 3, 48
 Manaita Rocks, 603, 605
 Mana Point, 853-4
 Mana-souari Island, 781
 Manati, Cape, 648
 Manatsuru Promontory, 632
 Manby Point, 479
 Manchuria, Coast of, 680, 685
 Mandarin Bluff, 641
 Manglos Road and Point, 135
 Mang Oosaki, 614
 Mangrove Bluff, 97
 Mangrove Island, 142
 Mangue Island, 9
 Manguera Island, 67
 Manjua Islands, 814
 Munnaijeu Bank, 780
 Mau-of-War Rock, 863
 Mantapeti Rocks, 746
 Manta Rocks, 746
 Manuel Antonio Island, 34
 Manuel Rodriguez Reef, 793
 Manzana Island, 55
 Manzanilla and Bay, 98, 99, 100
 Manzanilla, White Island of, 101
 Manziu Island, 604
 Maple Bay, 299
 Maple Point, 393
 Maquinna Point, 351
 Marabios Mountains, 49
 Maraki Island, 716
 Mararet Islands, 877
 Marcus Island, 876
 Margaret Islands, 877
 Margaretta Islands, 729
 Margarita Islands, 143
 Maria, Cape, 574
 Maria de Aome River, 125
 Maria Island, 711
 Maria Laxara Island, 859
 Maria Madre Island, 105
 Mariana Islands, 736, 785, 793
 Mariae, Tres, 104, 107
 Mariato Point, 17
 Mariere Island, 783
 Marietas Islands, Las, 104
 Mariensk Post, 686
 Maritch River, 539
 Mark Hill, 355
 Mark Island, 329, 334, 338
 Maro Reef, 863
 Mar, Piedra de, 106
 Marques Port, 93, 96
 Marrowstone Point, 257
 Marsden, Point, 464
 Marsden, Port, 468
 Marshall Archipelago, 694, 708, 718, 733, 877
 Marshall Island, 707, 716
 Marshall Point, 402, 405
 Marsh Reef, 894
 Martin Island, 403
 Maru-yama Point, 619
 Marvina Bay, 351-2
 Mary Basin, 355
 Mary Island, 407, 409
 Masachapa, 47
 Masapa, 47
 Ma-sima, 608
 Maskleyne Point, 432, 434
 Masnapi, 781
 Massacre Bay, 286, 516
 Massachusetts Island, 866
 Masset Harbour, 439
 Masui Sima, 692
 Matanchol, 104
 Matapalo Point, 30, 31, 33
 Mataua Island, 564
 Matelotas Islands, 769
 Matia Island, 277, 281
 Matilda Cove, 346
 Matoya Harbour, 621
 Matsmai, 648, 656
 Mats Sima, 675
 Matsui Island, 607
 Matsumae, 656
 Matsumae, Cape, 651
 Matsui Saki, 659
 Matsuyker, Cape, 654
 Matterer Bay, 779
 Matthew Island, 707, 716
 Mattole River, 206
 Matty Island, 777
 Matui-osaki, 662
 Matvoi Island, 631
 Maud Island, 412
 Maude Island, 391
 Maui Island, 819, 840
 Mauna Hualali, 827
 Mauna Haleakala, 841
 Mauna Kea Mountain, 827
 Mauna Loa Mountain, 825, 827
 Mauna o Eeka, 841
 Maury Passage, 282, 283
 May, Port, 589
 Mayor Channel, 324
 Mayo, Rio del, 126
 Mayne Bay, 339
 Mayne Island, 290, 302
 Mazatlan, 81, 112, 138
 McDonald's Creek, 206
 McKaye Harbour, 281
 McKay Reef, 342
 McLeod Harbour, 487
 McLoughlin, Fort, 429
 McNeil Bay, 323
 McNeil Island, 263
 McNeill, Port, 417
 Meaburn Island, 754
 Meac Sima Group, 682
 Meares, Cape, 230
 Meares Island, 343
 Meares, Port, 458
 Meares Reef, 888
 Medidor Island, 20, 21
 Medny Island, 549
 Meduro Island, 721
 Meetchken, Cape, 544
 Megami Point, 676
 Meiaco-sima, 687, 899
 Meiggsville, 205
 Meinghyngai Mountain, 540
 Meijima, 662
 Mejit Island, 724
 Mela Ledge, 643
 Mela Point and Ledge, 639
 Mellish Bank, 875
 Melones Island, 15
 Melville, Port, 898
 M'moyah, 646
 Menchikoff, Cape, 520
 Mendocino Bay, City, and Cape, 204-206
 Mendogino, Cape, 152, 175
 Menshikof, Cape, 584
 Menzies Bay, 412
 Menzies Point, 427
 Merat Island, 779
 Mercenarios Bay, 135
 Merizo Harbour, 798
 Mertens, Cape, 539, 540
 Mertens Monument, 739
 Mesa de Roldan, 55
 Mesa, La, 818
 Mesas de Juana de Gomez, 150
 Mesas de Narvaes, Las, 141
 Me Sima, 682
 Mesurier Point, 453, 482
 Metalanien Harbour, 743
 Metatchingui Mountain, 545
 Metchigm, 538
 Mexico, West Coast, 78, 914
 Miadi Island, 724
 Miaki Island, 626, 627, 671
 Michael Leymour Point, 690
 Michaelovski Fort, 524
 Michatoyat or Michitoya River, 73
 Microncia, 708
 Middlebrook Islands, 869
 Middle Channel, Rosario Strait, 277
 Middle Reef, 356
 Midway Islands, 869
 Mico, 610
 Miqa Point, 40, 41
 Mihara, 607
 Mikasa, 673
 Mikawa Bay, 621
 Mikomoto Island, 633
 Mikumi, and Roads, 662
 Mikura Island, 627
 Milbank Sound, 428

323
l, 263
t, 417
nd, 764
roup, 682
230
l, 343
458
888
nd, 20, 21
d, 549
d, 721
d, 544
nt, 676
nt, 687, 899
205
i Mountain, 640
724
443
and Ledge, 639
k, 875
and, 15
ort, 898
846
Cape, 520
Bay, City, and
—206
Cape, 152, 175
Cape, 584
y, 412
int, 427
nd, 779
s Bay, 135
rbour, 798
Cape, 539, 640
onument, 739
oldan, 55
818
Jua de Gomez,
Narvaes, Las, 141
682
Point, 453, 482
n Harbour, 743
guí Mountain, 645
t, 538
West Coast, 78, 914
and, 724
and, 626, 627, 671
Leymour Point, 690
vski Fort, 524
nt or Michitoya
73
ia, 708
ook Islands, 869
Channel, Rosario
277
Reef, 356
Islands, 869
10
int, 40, 41
607
673
Bay, 621
to Island, 633
and Roads, 662
Island, 627
k Sound, 428

Mile Rock, 185
Mile Rock Breaker, 364
Miles Cone, 421
Mili Island, 720
Mille Islands, 720
Minage Point, 676, 679
Minasi, 606
Minatitan, 84
Minato Mountains, 659
Mine Chimney, 389
Miners Bay, 305
Miners Channel, 295
Mingan Rock, 687
Mino Sima, 664
Minotye Bay, 615
Minto Breakers, 754
Minx Reef, 290
Mioga, 620
Mioga Sima, 619
Miogani-yama Mountain,
633, 644
Mira Island, La, 875
Miramontes Point, 180, 181
Mira-por-vos, 817
Misaki, and Bay, 680
Misama Nada, 601, 606
Mississippi Bay, 641
Misana Island, 635
Misipi Island, 789
Mistaken Island, 393
Misumi Harbour, 665
Mitake Island, 627
Mitalanien Harbour, 750
Mita Point, 104
Mitaraí, 607
Mitazidi, 606
Mitchell Bay, 418
Mitchell Harbour, 441
Mitchell Island, 706
Mitchell, Point, 465
Mitchigmenek Bay, 536, 538
Mitkoff, Cape, 518
Mitsuna Island, 900
Mittenatch Island, 397, 398,
409
Mitzuse Rocks, 674
Miya Saki, 616
Moai Island, 763
Modoo-papappa Island, 856
Moduenete Rock, 845
Modu-manu, 856
Moffet, Cape, 518
Moffat Rock, 419
Mogate, 47
Mogi Bay, 680
Mogmog Island, 766
Moira Sound, 453
Mokapu Peninsula, 846
Moke-tas Island, 361
Mikil Islands, 742
Mokor Islands, 757
Molejé Bay, 135
Molejé River, 134
Molexe, 127
Moller Bay, 519
Moller Island, 864
Molokai Island, 826, 845
Molokini Rock, 844
Molului Bay, 847

North Pacific.

Momobacho, 45
Momobacho Volcano, 47
Momotomita, 50
Momotombo, 49
Mona Island, 26
Monarch Head, 200
Monday Shoal, 370
Monge Islands, 814
Monita Bay, 21
Monita Island, 26
Monjes, Los, 818
Monjos Islands, Los, 776
Monk's Gate, 13
Monks Islands, 776
Monkonrushy Island, 562
Monneron Island, 579
Montague Channel, 399
Montague Harbour, 306
Montague Island, 131
Montagu Island, 483, 487
Monterey and Bay, 176, 182
Monte Santo Mountain, 744
Montverde Islands, 752
Montgomery Group, 898
Monitas Islands, 26
Montijo Bay, 17
Montserrate, 136
Montuosa, 28
Moody, Port, 384—396
Moore Channel, 442
Moore Island, 772
Morai, Cape, 713
Mordvinoff, Cape, 506
Mordvinoff Bay, 577
Moresby Island, 296, 436
Moresby Passage, 296
Moresby Passage & Islands,
289
Morjovi Island, 531, 532,
534
Morjovskoi, 518
Morosi Reef, 638
Morokini Rock, 844
Morotoi Island, 845
Morotzu, Cape, 602
Moro Yosi Harbour, 667
Morrell Island, 874
Morrison Rocks, 892
Morro Point, 83
Morrotinne Rock, 844
Morse Island, 292, 294, 531
Morses Island, 534
Mortlock Islands, 755, 757
Mosi Saki, 604
Mosquito Harbour, 344
Mosquito River, 590
Mosquito Passage, 293-4
Moto Island, 608
Motogozen Island, 764
Moto Yama, 606
Mouatt Reef, 323
Mouatt Point, 304
Mougoul Island, 742
Moule Bay, 587
Mourileu Islands, 758-9
Mowee Island, 840
Muchalet Arm, 253
Mudge, Cape, 391, 397, 408,
411

Mudge Island, 310
Mucla Island, 21
Muertos Island, 27
Mugu Point, 160, 161
Muko Sima, 607
Mulgrave Islands, 720, 731,
742
Mulgrave, Port, 477
Mullins Island, 336
Muloofsky, Cape, 676
Muitnomah River, 230
Mumenoki, 675
Murakame, 609
Muraviof Armurasky Pro-
montory, 589
Murcielagos Islands, 41
Murray, Cape, 443
Musoir Rock, 587
Musquillo Islands, 730
Mussel Canal, 429
Mussel Point, 647
Mussel Rock, 343
Mutine Point, 331
Mutiny Bay, 258
Mutok Island, 746
Mutokaloj Rock, 746
Mutsu Sima, 608
Muzon, Cape, 458
Myadsu, 663
Mysory Island, 750
Mystery Rock, 405

Naa Island, 750
Nacaome River, 56
Nacascolo, Port, 46
Nadoegada Island, 566
Naien Sound, 440
Nadesha Bay, 574
Nadieja Bay, 574
Nadieja, Cape, 651, 655
Nadieja Rocks, 681
Nadieja Strait, 564
Nagano Sima, 674
Nagasaki, 670, 673, 679, 683,
685
Nagasaki, and Harbour, 676,
677
Nagasaki Peninsula, East
Coast, 680
Nagasaki Peninsula, West
Coast, 675
Nagato Province, 664
Nagay Island, 602
Naginato Rock, 675
Naguiscola, Port, 46
Naguh, 898
Nahmint Bay, 332
Nahwitti Bar, 420, 422
Naiad Islands, 751
Najasee Bay and River,
583
Nakase Rock, 614
Naka Sima, 614, 893
Nakko Head, 579
Naknek River, 520
Nakosi, 666
Naku Harbour, 599
Nalan Island, 741
Nalap Island, 748

3 T

- Nalatcheff, Cape, 555
 Namarik Islands, 731
 Namar Island, 748
 Nambu, Cape, 645, 647, 652
 Nami-kiri-saki, 621
 Namo Islands, 729
 Namoliacur Island, 762
 Namolipafane Island, 759
 Namoluk Islands, 757
 Namouine Island, 759
 Namonuito Island, 759
 Namou Island, 728
 Namourousse Island, 758
 Namouttek Island, 762
 Namureck Island, 731
 Namurrek Island, 762
 Nanek River, 620
 Nanimak Island, 503
 Nanaimo, 299, 306
 Nanaimo and Harbour, 388
 Nanaimoo Pass, 378
 Nanao, 661
 Nanavalle, 828
 Nanoozo Harbour and Hill, 391
 Nanouantought Lake, 497, 520
 Nanouki Island, 713
 Nanouti, 713
 Nanow, 601
 Napha, 898
 Napha King Road, 895, 897
 Napoleon Gulf, 589
 Napok-on Road, 687
 Naranjas Island, 17
 Naranjos Islands, 34
 Naranjo Point, 34
 Narrowgut Creek, 360
 Narrow Island, 307
 Narrow Islands, 352
 Narrows, The, 332, 385
 Naru Channel, 671
 Naruto Passage, 610, 614
 Narusi Rock, 603, 605
 Naru Sima, 671
 Na Saki Island, 682
 Nasul River, 245
 Nash Bank, 396
 Na Sima, 667
 Nasperti Inlet, 364
 Nass Bay, 434
 Nass River, 434
 Nata, 10
 Nat-a-hats Lagoon, 230
 Nathan, Cape, 43
 Natividad, 147
 Native Point, 308
 Natungu Saki, 664
 Nautilus Rock, 889
 Nautilus Shoal, 711
 Navarin, Cape, 546
 Navidad Bay and Head, 99, 100-1, 104
 Navidad Rock, 101
 Navy Channel, 291
 Nawoda Island, 717
 Neavas Island, 866
 Nechesne River, 229
 Necker Island, 860
 Neck Point, 284
 Necomanche River, 245
 Ned's Rocks, 247
 Ned-ah Bay, 224, 249, 252
 Needle Mountain, 554
 Needle Rock, 356
 Neegtehan, Cape, 639, 540
 Neguda Point, 17
 Negrito Bluff, 22
 Negritos Islands, 37, 60
 Nehalem River, 230
 Nekas River, 229
 Nelson Island, 403-4
 Nelson Point, 450
 Nemoro, Port, 654
 Nepeun Point, 460
 Nepean Sound, 430
 Neprop Island, 473
 Nesbitt Point, 455
 Nestuggah River, 229
 Nettle Island, 336
 Neuskoh'l, 247
 Neva Channel, 467
 Neva River, 676
 Neva Shoal and Island, 865, 866
 Nevardo River, 204
 Neville Island, 784
 Neville, Port, 415
 New Aberdeen, 428
 New Albion, 153
 New Archangel, 446
 New Baldayo Island, 789
 New Bank, 370
 Newcastle Island, 312, 389
 New Channel, 423
 New Cornwall, 376
 Newenham, Cape, 520-1
 New Granada, Coast of, 5
 New Hanover, 376
 New Harbour, 773
 New Island, 789, 859, 866
 Newmarket, 262
 New Market Island, 706
 New Nantucket Island, 703
 New Point, 247
 New Westminster, 382-3
 New Year Island, 724
 New York Island, 701
 Nezumi Sima, 608
 Nezu Sima, 608
 Ngaryk Islands, 752
 Ngatik Islands, 752
 Ngoli Islands, 769
 Niaur Island, 775
 Nicaragua, and Lake, 3, 43, 47, 49
 Nicoya Gulf, 29, 35, 37
 Niegata, 659
 Nielec Creek, 230
 Nigo Point, 802
 Nihoa Island, 856
 Nii Sima, 626
 Niihau Island, 822, 855
 Nikla, Cape, 672
 Nikolaevsk, 585
 Nikol'skoi, 613
 Nile Rock, 403
 Nile Shoal, 763
 Nimpkish Bank, 418
 Nimpkish River, 417
 Ninepin Rock, 588
 Ninirlioun, Cape, 543, 544
 Nimmocheou Reef, 740
 Nipon Island, 596, 616
 Nipon, East Coast, 645
 Nipon, West Coast, 657
 Nipple Hill, 148
 Nisi Sima, 664
 Nisqually, 218, 262, 263
 Nitinat Lake, 328
 Nizumi Sima, 676
 Nob Point, 281, 330, 366
 Nodaka Canal, 413
 Noel, Port, 723
 Nogowino Sima, 606
 Noisak, Cape, 606
 Nokona, 606
 No-ko-no Sima, 666
 Noma Sima, 615
 Nomi, 600
 Nomo, Cape, 680
 Nomo Rock, 675
 Nomo Saki, 673-4
 Nomo Ura Harbour, 675
 Nomoyama Point, 674
 Noo-narbook Island, 530
 Noonday Rock, 199
 Nootka Island, 354
 Nootka Sound, 215, 315, 348, 350, 919
 No Point, 259
 Norfolk Bay, 920
 Norfolk Sound, 472
 Norman Point, 396
 Norris Rock, 396
 North Bay, 247, 278
 North Bay Reef, 618
 North Bay, Saghalin, 574
 North Channel, 345
 North Island, 496
 North Reef, 308
 Northumberland, Cape, 452
 Northumberland Channel, 310, 390
 Norton Sound, 523
 Nose Peak, 368
 No Sima, 643, 675
 Nosima Reef, 617
 Nosima Point, 632, 639
 Nosovskoi Volcano, 606
 Nossyam, Cape, 654
 Nossyab, Cape, 579, 657
 Notched Hill, 391
 Notch Island, 602
 Noto, Cape, 660, 661
 Notoro, Cape, 577
 Notsky, Port, 654
 Nouchagak River, 521
 Nougouore Islands, 752
 Nounagmo, Cape, 536
 Nounangan Island, 541
 Nounagmo and Cape, 536
 Nounshagak River, 521
 Nova Chista, 125
 Novik Bay, 589
 Novgorod Harbour, 587-8

- 763
 ank, 418
 River, 417
 ck, 588
 Cape, 543, 544
 u Reef, 740
 nd, 596, 616
 t Coast, 645
 st Coast, 657
 li, 148
 664
 218, 262, 263
 ke, 328
 ma, 678
 , 281, 330, 366
 anal, 413
 t, 723
 Sima, 606
 ape, 606
 606
 Sima, 666
 na, 615
 0
 ape, 680
 ck, 675
 ki, 673-4
 ra Harbour, 675
 na Point, 674
 ck Island, 530
 Rock, 199
 Island, 354
 Sound, 215, 315, 348,
 19
 t, 259
 Bay, 920
 Sound, 472
 Point, 396
 Rock, 396
 Bay, 247, 278
 Bay Reef, 618
 Bay, Saghalin, 574
 Channel, 345
 Island, 496
 Reef, 308
 mberland, Cape, 452
 mberland Channel,
 390
 a Sound, 523
 Peak, 368
 ma, 643, 675
 a Reef, 617
 a Point, 632, 639
 skoi Volcano, 606
 am, Cape, 654
 ab, Cape, 579, 657
 ed Hill, 391
 Island, 602
 Cape, 660, 661
 ro, Cape, 577
 ty, Port, 654
 hagak River, 521
 ouore Islands, 752
 nagmo, Cape, 536
 neangan Island, 541
 iangmo and Cape, 536
 hagak River, 521
 Chista, 125
 k Bay, 589
 gorod Harbour, 587-8
- Novosilzov, Cape, 536
 Novy Islands, 533
 Nowell Point, 486
 Noyon River, 204
 Nublada Island, 787
 Nuehatlitz Inlet, 354
 Nuehatlitz Reef, 355
 Nuinak Island, 502
 Nukunau Island, 710
 Nukuor Islands, 752
 Nulato, 523
 Numukamis Bay, 329
 Naniwak I-land, 522
 Nut District, 745
 Nuuanu Valley, 847
 Nygthygan, Cape, 538
 Nyo Rock, 424
- Okino Islands, 663
 Oki Sima, 673
 Okino Sima, Mount, 600,
 616
 Oko Island, 599
 Okosiri Island, 652, 653
 Oku-Jesso River, 573
 Okuno, 607
 Olap Island, 780
 Old Port Bay, 509
 Olga Bay, 590
 Olimarao Islands, 763
 Olioutor River, 550
 Olot Island, 723
 Olutorskoi, Cape and Gulf,
 517
 Olympia, 263
 Olympus Mountain, 218
 Olympus Mountains, 218
 Omae-saki, 621, 636, 642
 Omaki Sima, 646
 Ommaney, Cape, 459, 467
 Omotepe Island, 48
 Omotepec or Omotepecque
 Volcano, 45, 49
 Omuru Rock, 891
 Onango-sima, 628
 Ouata Islands, 781
 Onavero Island, 717
 O'Neal Island, 279
 Onceheow Island, 855
 One-mile Rocks, 185
 One Tree Island, 422
 Ougai Island, 742
 Ongelukkiir Eyland, 628
 Onnekoton Island, 564
 Onnodake Mountain, 896
 Onon River, 584
 Onoaton Island, 711
 Onohara, 627
 Onoon Island, 760
 Onooup Island, 760
 Onslow Point, 453, 455
 Onting, Port, 898
 Onutu Island, 771
 Oobiki Uura, 617
 Oo-ghe-e-ak Island, 530
 Ookomura Bay, 675
 Oonella Island, 508
 Oonge Sima, 614
 Oorokoo Island, 773
 Oosaka, and Gulf, 610-11
 Oo Saka, Gulf of, 601
 Oosaka Roads, 612
 Oosima, 681
 Oo-sima Island, 625
 Oo-sima Harbour, 619
 Ooto Nizavoo, Cape, 656
 Ooujak Bay, 496
 Open Bay, 293, 372, 408
 Opolu Point, 833
 Opooroah, 848
 Orattilipou Bank, 762
 Oruluk Island, 753
 Orange Point, 412
 Orcas Island, 273, 275, 277,
 279, 281, 284-5, 379
 Orcas Nob, 278
 Orchard, Port, 259
- Oreehoua Island, 856
 Oregon City, 242
 Oregon, Coast of, 215
 Orford Bay, 410
 Orford, Cape, 213
 Orford Reef and Cape,
 222
 Orford, Port, 220-1
 Ormed Island, 723
 Orolong Island, 775
 Orono Sima, 665, 687
 Orosi, Peak of, 42
 Orosi Volcano, 45
 Oroté Point, 800
 Oroti Point, 799
 Osaki and Bay, 616
 Osakiye Island, 607
 Osborn Bay, 299
 Osc Saki, 672
 O-sima, 607-609, 665
 Osima Islands, 621
 O-simi, 656
 Ostrovki Islands, 533
 Otakara Point, 672
 Otate Island, 670
 Otlia Islands, 723
 Otmeloi, Cape, 575
 Otoque Island, 15
 Otra Island, 875
 Otsiai, Cape, 583
 Otsu-no-saki, 609
 Otter Bay, 304
 Otter Cove, 413
 Otter Point, 317
 Otters, Bay of, 507-8
 Otters, Island of, 514
 Otzuno Saki, 610
 Oulan Island, 739
 Ouchouganat Island, 490
 Oudagagh Channel, 508
 Ouda, Fort and River,
 572
 Oudskoi, Fort, 572
 Ouektok Island, 506
 Ougagouk River, 497, 501
 Ougalgin Island, 508
 Ougamok Island, 506
 Ougatchik River, 520
 Ougmagak, 503
 Oukamok Island, 502
 Oukinskoi, Cape, 552
 Oukivok Island, 527
 Onleai Islands, 764
 Outlemeray Island, 765
 Ouliakhpen, Cape, 542-3
 Ouliago Mountain, 510
 Ouluthy Island, 766
 Oumnak Island, 509
 Oumnagh Island, 508
 Oumnak Strait and Island,
 509
 Ounalga Island, 508, 615
 Ounalga Strait, 511
 Ounashka Island, 507
 Ounalik Island, 760
 Ounatchogh, 503
 Ounga Island, 502
 Ounimak, Cape, 520
 Ounimak Island, 504-5

Ounimak Strait and Islands, 506
 Ou-on-kinah Inlet, 359, 363
 O Wahi, 826
 Owari Bay, 621
 Owen Island, 316
 Owhyhee Island, 826
 Owhyhee Island, 826
 Oyster Bay, 397
 Oyster Harbour, 299
 Oyster Island, 582
 Ozernoi, Cape, 553
 Ozzard, Mount, 340

Panapa Island, 717
 Pacayo Volcano, 74
 Pacheca Channel, 7
 Pacheca Island, 7
 Pachena Bay, 328
 Pa-chung-san Islands, 900
 Pacific City, 241
 Pacific Island, 893
 Pacora Island, 20
 Padilla Bay, 268-9
 Padraa, 135
 Pafia, Cape, 140
 Pagan Island, 813
 Paghelinn, Cape, 540
 Pago Harbour, 802
 Pagon Island, 613
 Pagoobnov Strait, 467
 Paipoua Cove, 803
 Pajaro, Bahia del, 21
 Pajaro, Rio del, 21, 178
 Pajaros Id., 7, 22, 65, 114
 Pajaros, Islas de los, 113
 Pajaros Rocks, 9, 126
 Pakenham Point, 485
 Pakeen Islands, 751
 Pakin Islands, 751
 Pula Point, 117
 Palaos Islands, 776
 Palenque Island, 25, 2.
 Palau Islands, 770
 Pali, The, 850
 Pali Kulau District, 846
 Pallada Road, 587
 Pallou Islands, 768
 Pallas Mountain or Peak, 656
 Pallas Rocks, 682-3
 Palliou Island, 765, 770
 Palma, Cape, 140
 Palmer Point, 337
 Palmer Reef, 859, 866
 Palmerston, Cape, 373
 Palmyra Island, 701
 Palux River, 244
 Pamplona Rock, 480
 Panaloya River, 48
 Panama, 10
 Panama Bay, 6 911
 Panama, Isthmus and Rail-road, 1
 Panama Reef, 268
 Pan de Azucar, 37
 Pander Island, 414
 Pandora Peak, 316

Pane Bay, 741
 Panian Harbour, 745
 Phoungvumut, 520
 Papagayo, 52
 Papagayo, Bight of, 40
 Papenburg Bluff, 676
 Papenburg Island, 673
 Parece Vela, 888
 Parida, 28
 Paridas Islands, 27
 Parita Bay, 15
 Parker Island, 306
 Parker, Point, 464
 Parker Reef, 281
 Parker Shoal, 509
 Park Hill, 278
 Parry Bay, 319
 Parry Channel, 436, 440
 Parry Group, The, 880
 Parry's Island, 732
 Partridge Point, 257, 266
 Parum Rock, 746
 Pascalo Bay, 520
 Pasley Island, 400
 Pasquel, 48
 Passage Canal, 485, 492
 Passage Island, 385, 489
 Passage Reef, 667
 Passage Rock, 9, 285, 342, 400
 Passage Rocks, 686
 Passage Reef, 618
 Passages, 953-975
 Cape Horn to California and British Columbia, 953-959; British California and Australia, 959; Panama to California, 961; California, &c., to Peru, 965; Central America, Mexico, &c., 965; Southward and Panama, 966; Panama Westward, 966; Galapagos Islands to Cape San Lucas, 967; South America to Central America, 968; Coast of California, 969; San Francisco, 970; Between California and China, 972; Between the Islands, &c., 973; Across the Equator, 974; Sandwich Islands, to the Northward and Eastward, 974
 Passarera Island, 102
 Passion Island or Rock, 786
 Pastolik, 24
 Patay Point, 802
 Paterson Islands, 729
 Patey Rock, 297
 Patience, Cape, and Bay, 576
 Patino Point, 6
 Putoa Road, 843
 Patos Islands, 378, 280-1, 288
 Patos, De los, 130
 Patrocinio Island, 874

Paukan Point, 829
 Paulogue Islands, 770
 Pavlovskaya Bay, 518
 Payo Island, 23
 Pazaca River, 63
 Paz Harbour, La, 136
 Pazas River, 72
 Paza, Rio, 63
 Peacock Channel, 339
 Peacock Spit, 241
 Pearce Point, 431
 Peapoda, The, 275
 Pearl Archipelago, 6
 Pearl and Hermes Reef, 866
 Pearl Lagoon, The, 848
 Pearl River Harbour, 818
 Pearl Rocks, 426
 Pearce Islands, 418
 Pearson Island, 403
 Pedan Islands, 781
 Pedder Bay, 319
 Pedder Island, 721
 Pedro-nales, 172
 Pedernales Point, 172
 Peel Island, 419, 880, 881
 Peguenema Islands, 751
 Peile Point, 303, 306
 Pejaros Point, 21
 Pelado Islet, 10
 Pelees Islands, 588
 Pelelep Island, 742
 Pelelew Island, 775
 Pelew Islands, 734, 770
 Pelican Bay, 213, 219
 Peligrosa, El Canal, 130
 Pell Island, 865
 Pellow, Point, 485
 Pender Harbour, 403
 Pender Island, 290-1
 Penjina River, 560
 Penjusk Bay, 547
 Penkegnei Bay, 539-40
 Penwell Island, 893
 Penn Islands, 409
 Penn's Cove, 266
 Pequena Bay, 142, 144
 Percy, Point, 453
 Perdona Rock, 23
 Perico Island, 13
 Perigne Rock, 15
 Perlas Islands, 6
 Pernicious Strait, 467
 Peroat Island, 711
 Perouse Strait, La, 578
 Perpetua, Cape, 228
 Perry Bay, 8
 Perry Island, 641, 886
 Perry Rock, 290
 Peru Island, 708, 710
 Perula Bay, 102
 Pescado Blanco Bay, 147
 Pescadore Islands, 726
 Pestchanoi Point, 588
 Petaluma Creek, 201
 Petaplan Hill, 96
 Petatlan, Morro de, 96
 Peter the Great Bay, 589
 Petillo Point, 12
 Potrel Island, 791

nt, 829
lands, 770
Bay, 518
1, 23
er, 63
r, La, 136
r, 72
63
annel, 339
it, 241
nt, 431
he, 275
ipelago, 6
ormosa Reef, 866
on, The, 848
r Harbour, 818
s, 426
ands, 418
land, 403
ands, 781
y, 319
and, 721
es, 172
s Point, 172
d, 419, 880, 881
a Islands, 761
at, 303, 306
point, 21
let, 10
ands, 688
land, 742
land, 775
ands, 734, 770
ay, 213, 219
El Canal, 130
nd, 865
Point, 485
arbour, 403
land, 290-1
river, 560
Bay, 547
ei Bay, 539-40
Island, 893
ands, 409
Cove, 265
Bay, 142, 144
Cove, 453
Rock, 23
eland, 13
Rock, 15
lands, 6
us Strait, 467
land, 711
Strait, La, 578
a, Cape, 228
ay, 8
eland, 641, 886
Rock, 290
land, 708, 710
Bay, 102
Blanco Bay, 147
re Islands, 726
noi Point, 588
na Creek, 201
n Hill, 96
n, Morro de, 96
he Great Bay, 580
Point, 12
Island, 791

Petropaulovski, 555, 557,
560
Petropaulovski Harbour,
567
Phoebe Island, 703
Philadelphia Id., 859, 864,
866
Philip Island, 766
Phillimore Point, 306
Phillipine Islands, 817
Phipps, Cape, 476-7
Phipps Point, 484
Pichiligue, 80
Pichilingue Bay, 137
Pin-de-Langlo Mountain,
578, 657
Pico Channel, 567
Pie Island, 488
Piedra Blanca, 90-99
Piedras Blancas, 174
Piera Island, 296-7
Pigali Island, 792
Pigon Island, 722
Pigeon Island, 879
Pigeon River, 210
Pigot Point, 485
Pigouelo Island, 762
Pikela Island, 762
Pikelot Island, 762
Pilas, Las, 3
Pilier Rock, 587
Piliul Island, 775
Piliul Island, 760
Pillarcitos, Arroya de los,
181
Pillar Hill Tree, 238
Pillar Point, 180, 254
Pillar Rock, 180
Pillay Shoal, 370
Pilot Knob, 221
Pinoda, 45
Pino, Cape, 495
Pino Island, 245, 424
Pingel Islands, 742
Pinna Channel, 361
Pinnacle Rock, 336
Pinnacle Island, 360, 532,
893, 904
Pinnacle Point, 363, 559
Pinnacle Rock, 204, 253
Pinos Point, and Light,
176
Pioneer Rocks, 681
Pipestem Inlet, 339
Pique Bay, 592
Pisayama Rock, 619
Piscador River, 180
Pise Island, 758
Piscarr Island, 760
Pitt Archipelago, 430
Pitt Island, 467, 708, 717
Pitt River, 384
Pivay Bay, 21
Pizaras Island, 760
Platanal Point, 30, 31
Playa Brava Sand, 21
Playa de Chicarene, 62
Playa Grande, 16
Playa Hormosa, 46

Playa Maria Bay, 148
Plaza Grande, 26
Pleasant Island, 717
Pleasant Islands, 793
Plover Bay, 542
Plover Point, 311
Plover Rock, 342
Plumper Bay, 321, 413
Plumper Cove, 400
Plumper Harbour, 352-3
Plumper Island, 370
Plumper Pass, 287, 325
Plumper Reef and Sound,
280, 288-9
Plunger Pass, 407
Plymouth Island, 879
Plymouth or Kidd Island,
885
Plymouth Rocks, 639, 643
Pnaougoun, Cape, 536
Podopotchnoi Peak, 513
Poett Nook, 329
Pogobi, Cape, 580
Pogromoi Volcano, 506
Pointers Reef, 433
Pointers Rock, 449
Poison Cove, 429
Poitlik Point, 746
Pole, Cape, 457
Pollard Island, 863
Pollard Rock, 863
Polly River, 454
Polat Islands, 761
Polovinchaty Rock, 548
Ponafidin Island, 630
Ponalo Bay, 497, 501
Ponapi Island, 736
Ponapi Islands, 743
Ponente Point, 51
Porcada Island, 23
Poromushir Island, 562
Porpoise Rock, 102, 494
Portier, 308
Portier Pass, 287, 306, 384,
387
Portland, 242
Portland Canal, 432, 434,
445, 449
Portland Island, 296
Portland Point, 341
Portlock Harbour, 471
Portlock Point, 304
Portsmouth Breakers, 622
Posiote Bay, 587
Possession Point, 317, 492
Possession Sound, 259, 265
Postels, Cape, 541
Potainikoff, Cape, 512
Poulouhot Island, 761
Pouloupa Island, 743
Poulousouk Island, 761
Powhattan Bay, 640
Powhattan Reef, 891
Preedy Harbour, 299, 301
Presidio Shoal, 188
Prevost Harbour, 291
Prevost Island, 291, 303,
306, 436
Prevost Passage, 296

Prevost Peak, 565
Pribiloff Islands, 533
Prideaux Point, 371
Princessa Island, 729
Princessa Louisa Inlet, 401
Princessa Royal Islands, 428
Princessa Royal Reach, 404
Prince Island, 627
Prince Ernest Sound, 453--
455
Prince Frederick Sound,
459
Prince William Sound, 487,
489, 919
Prince of Wales Archipe-
lago, 452
Prince of Wales, Cape, 529
Prince of Wales Reach,
404
Principe, Canal de, 432
Prisoners Harbour, 170
Proche Island, 494
Prokofieff Island, 572
Pronge, Cape, 585
Prospect Island, 701
Prower Rock, 424
Protection Island, 256, 336,
388
Protection, Port, 456
Providence Cove, 316
Providence Islands, 733
Providence, Port, 542
Pueblo de los Angeles, 160
Pueblo Nuevo, 22
Puerco Point, 17
Pueril, 21
Pueril Island, 20
Puertesitos, 130
Puerto Falsa, 158
Puffin Islet, 277
Pugot, Cape, 486
Pugot Sound, 217, 241, 258,
262, 378
Pully Point, 261
Pulo-souk, 761
Pulpito de San Juan, 135
Puna, 828
Puna Cove, 853
Puna Mountains, 840
Punch Bowl, The, 850
Punta Gorda, 174
Purissima River and Point,
172
Pustareak, 589
Puzzle Island, 336
Pybus Point, 460-1
Pyghella Island, 762
Pyke Point, 486
Pylades Channel, 310
Pylstaart Island, 874
Pym Island, 295
Pyramid Rock, 134, 577

Quadra, Boca de, 450
Quadra Hill, 307
Quadra Island, 271
Qualicum River and Bay,
393

- Quartermaster Harbour, 262
 Quathlasky Cove, 411
 Quatsino Narrows, 371
 Quatsino Sound, 367, 372
 Queen Charlotte's Channel, 399
 Queen Charlotte's Island, 215
 Queen Charlotte Islands, 435
 Queen Charlotte Sound, 417, 419
 Queen's Cove, 357-8
 Queen's Reach, 404
 Queen Rock, 138
 Quelama River, 67
 Que-ni-utl River, 248
 Quepos Islands, 34
 Quepos Point, Las, 34
 Quibito, 19
 Quibo Island, 17
 Quicksand Bay, 231
 Quisiguina, 58
 Quitshak River, 521
 Quoin Hill, 579
 Quoin Point, 582
 Quoy Island, 780
- Rabb't Island, 791
 Raccoon Straits, 189
 Race Island, 317
 Race Islands, 251-2
 Race Islands and Passage, 318
 Race Narrows, 344
 Race Pass, 415, 418
 Race Point, 298
 Radack Islands, 719
 Radack Sea, The, 726
 Radakala Islands, 727
 Rafael Point, 346
 Raft Cove, 373
 Ragged Island, 300, 310, 334, 337
 Ragged Islands, 405
 Ragged Point, 372
 Rai Islands, 729
 Rukoko Island, 564
 Rainier Mountain, 261, 267
 Rakovya and Shoal, 559
 Rakovya Bay & Harbour, 555, 557
 Rakovya Harbour & Bank, 556
 Raleigh Rock, 904
 Ralik Chain, The, 726
 Ralik Islands, 719
 Ramsden Point, 434
 Ramat Island, 844
 Rancheria, 19
 Rankin Point, 898
 Raour Island, 764
 Rasa Island, 458, 890
 Rascals, Village of, 428
 Rashau Island, 564
 Raspberry Island, 431
- Ratak Islands, 718
 Ratcher Island, 711
 Rat Islands, 505, 515-6
 Ratmanoff, Cape, 575
 Ratmanoff Island, 530
 Ratmanoff, Port, 540
 Rattler Rock, 647
 Rankoko Island, 564
 Raven Islands, 722, 752
 Razor Point, 290
 Road Island, 408
 Road Islands, 406
 Realejo, 3, 38, 49, 52
 Reaumer Peak, 777
 Rebecca Spit, 408
 Rebutisiribi Island, 505
 Recruit Island, 904
 Red Bluff, 207
 Red Cliff, 686
 Red Cliff Island, 588
 Red Cliffs, 646
 Red Island, 305
 Red Island Point, 304
 Red Cliff Point, 831
 Red Stripe Mountain, 366
 Redding's Rock, 211
 Redfern Island, 424
 Redfield Rocks, 627
 Redonda, 335
 Redondo, Cape, 142
 Redondo Rock, 15
 Reed Island, 666
 Reed Rocks, 859
 Reef Island, 284-5, 329
 Reef Islands, 897
 Reef Point, 310, 368, 369, 407
 Refuge Cove, 32, 346
 Refansiri Island, 578
 Rehusa Channel, 141
 Reid Harbour, 291
 Reid Rock, 279
 Reindeer Island, 503
 Rejnoff, Cape, 518
 Remedios, 64
 Remedios Point, 69, 70
 Romolina, Punta, 56
 Rennell Sound, 441
 Resiri Island, 578
 Resolution Cove, 353
 Restoration Cove, 427
 Restoration Point, 260
 Resurrection Gulf, 488
 Retreat Point, 463, 464
 Retribution Rocks, 652
 Revilla Gigedo, 450
 Revilla Gigedo Canal, 452
 Revilla Gigedo Islands, 787
 Reyes Islands, 734
 Rey, Islas del, 6, 8, 249, 196
 Reyes, Punta de los, 191
 Rica de Oro, 632
 Rica de Plata, 875
 Richard's Island, 664
 Richard Rock, 339
 Rich's Island, Sir R., 778
 Richmond Rocks, 103
 Rechuassen River, 780
- Redonla Island, 406
 Rigné, Cape, 778
 Rikard, Cape, 566
 Rikimushiri Island, 654
 Rimnik, Cape, 575
 Rimski-korsakoff Islands, 718, 726-7
 Rincon, Rio, 31-2
 Riou Point, 479
 Ripple Point and Shoal, 414, 417
 Ritchie Bay, 344
 Ritidian Point, 802
 Rivadeneyra Shoal, 694
 Rivas Point, 102, 426
 Roan Kiddi River, 748
 Robben Island, 576
 Robbers Island, 330, 335
 Robbers Nob, 415
 Robert Point, 344
 Roberts Bank, 380
 Roberts Point, 269, 276, 379, 397
 Robinet Rock, 686
 Roble, Punta, 21
 Robson Island, 369
 Roca Coral Island, 789
 Roca Pardo, 789
 Roca Partida, 788
 Roche Harbour, 289, 293
 Roikhpak River, 522
 Rock Island, 633, 636
 Rock Islet, 268
 Rocky Bay, 279
 Rocky Cape, 526
 Rocky Island, 686, 777
 Rocky Pass, 346
 Rocky Point, 387
 Rodd Point, 321
 Rodney, Point, 527
 Roa Mountain, 839
 Rongerik Islands, 727
 Roger Simpson Island, 714
 Rogue's River and Reef, 219
 Roic Mountain, 745
 Roiven, Cape, 660-1
 Rojnoff, Cape, 519
 Rojo, Mar, 121
 Rokuren Island, 602
 Rollin, Cape, 565
 Rolling Roadstead, 357
 Romanzoff, Cape, 522, 657
 Romanzoff, Islands, 723
 Romanzov Bay, 579
 Rono Kiti Harbour, 747
 Roqueta Island, 92, 93, 95
 Rosa Island, 891
 Rosario, 123
 Rosario Bay, 86
 Rosario, Bahía del, 21, 88
 Rosario, Rio del, 112
 Rosario Island, 888
 Rosario Point, 21
 Rosario Strait, 267, 274, 278, 377
 Roselale Rock, 318
 Rose Harbour, 438
 Rose Point, 439

anta Island, 406
 e, Cape, 778
 rd, Cape, 566
 nushiri Island, 654
 ik, Cape, 575
 ki-korsakoff Islands,
 3, 726-7
 on, Rio, 31-2
 Point, 479
 le Point and Shoal,
 4, 417
 io Bay, 344
 dian Point, 802
 deneyra Shoal, 694
 s Point, 102, 426
 a Kiddi River, 748
 ben Island, 576
 bers Island, 330, 335
 bers Nob, 415
 ert Point, 344
 erts Bank, 380
 orts Point, 269, 276,
 79, 397
 inet Rock, 686
 le, Punta, 21
 son Island, 369
 a Coral Island, 789
 a Pardero, 789
 a Partida, 788
 he Harbour, 289, 293
 khpak River, 522
 k Island, 633, 636
 k Islet, 268
 ky Bay, 279
 ky Cape, 526
 ky Island, 686, 777
 ky Pass, 346
 ky Point, 387
 id Point, 321
 lney, Point, 527
 a Mountain, 839
 ngerik Islands, 727
 ger Simpson Island, 714
 gue's River and Reef,
 219
 ic Mountain, 745
 iven, Cape, 680-1
 jnoff, Cape, 619
 jo, Mar, 121
 kuren Island, 602
 llin, Cape, 565
 olling Roadstead, 357
 omanzoff, Cape, 522, 657
 omanzoff, Islands, 723
 omanzov Bay, 579
 ono Kiti Harbour, 747
 oqueta Island, 92, 93, 95
 osa Island, 891
 osario, 123
 osario Bay, 86
 osario, Bahia del, 21, 88
 osario, Rio del, 112
 osario Island, 888
 osario Point, 21
 osario Strait, 267, 274,
 278, 377
 osefale Rock, 318
 ose Harbour, 438
 ose Point, 439

Rosa Spit, 436
 Roshnoff, Cape, 518
 Ross Bay, 323
 Ross, Fort, 201
 Ross Islands, 730
 Ross Mountain, 155, 194,
 202
 Ross, Port, 920
 Rota Island, 803
 Rothsay Point, 454
 Rough Bay, 418
 Round Island, 245, 309,
 338, 371, 419, 521, 565
 Roumiantsoff, Cape, 522
 Rowe River, 321
 Royal Bay or Roads, 320
 Royalist Islands, 758
 Royalist Islet, 893
 Rua Island, 758
 Rudder Reef, 392
 Rudlin Bay, 325
 Ragged Point, 359, 360
 Ruk Island, 758
 Rupert Arm, 367, 371
 Rupert, Fort, 419
 Rurick Strait, 506, 724
 Russell, Cape, 373
 Russell Island, 297
 Russian River, 201-2
 Ryche Poncio Group, 682
 Rhythynin, Cape, 540

Saanich, 295
 Saanich Inlet, 297
 Saba Sima, 606
 Sabine Channel, 391, 401
 Sabine Group, 893
 Sable Island, 713
 Sabo River, 799
 Saboga Island, 7
 Sacate Islands, 34
 Sacate Grande, 56, 57
 Sacate Point, 42
 Sacatula River, 97
 Sachine Strait, 457
 Sacrificios Island, 91
 Saddle Hill, 247
 Saddle Mountain, 647
 Sado Island, 657-8
 Safety Cove, or Port, 426
 Sagami, Cape, 632, 638,
 643
 Sagami Hills, 638
 Sagami Peninsula, 633
 Saghalin, Island of, 573
 Saghalin Peninsula, 568
 Saga sima, 672
 SAILING DIRECTIONS, see
 PASSAGES
 Sailor Point, 322
 Sail Rock, 180, 334, 338,
 669, 881
 Saino Island, 26
 Sainson Island, 779
 St. Abraham Island, 531
 — Albans Point, 457
 — Andrew Islands, 784
 — Antony's Peak, 567

St. Augustine Mountain,
 490
 — Benedicto Island, 787
 — Croix, Gulf of, 541, 544
 — David Islands, 781
 — Elena, Cape, 41-2
 — Elias, Mount, 445, 479,
 480
 — Elmo Bay, 8
 — Francis, Port, 920
 — George Island, 105
 — George's Island, 533
 — George Point, 213, 219
 — Helens Mountain, 237,
 242
 — Hilario Island, 150
 — James, Cape, 437
 — John Point, 396, 398
 — Jonas Island, 572
 — Lawrence Bay, 536
 — Lawrence Island, 530
 — Lazarus Islands, 143
 — Lazaro Peak, 821
 — Lucas, Cape, 121, 915
 — Marcian Island, 515
 — Mary, Cape, 275
 — Mary Point, 466
 — Matthew Island, 531
 — Michael's Island, 524
 — Paul, Harbour of, 494
 — Paul's Island, 533
 — Pedro Nolasco Island,
 129
 — Peter's Rock, 630
 — Sebastian, 124
 — Sorento, 130
 — Stephen Island, 502, 516,
 531
 — Thaddeus, Cape, 546
 — Theodore Island, 631
 — Vladimir Bay, 589, 591,
 923
 — Vincent Channel, 609
 — Xavier Island, 592
 Saipan Island, 807
 Sai Sima, 609
 Seito Reef, 618
 Sajouliucktsaigh Island,
 602
 Sakai River, 612
 Sakate Bay, 609
 Sakura Island, 599
 Salina Cruz Bay, 84
 Salina del Marques, 84
 Salisbury, Point, 463
 Salinas, 85
 Salinas Bay and Island, 42
 Salinas River, 178
 Salinas, Morro de las, 86
 Salinas Plains, 179
 Salinas Bay, 29
 Salmon Bank, 277
 Salmon Bay, 415, 577
 Salmon Creek, 202
 Salmon Cove, 434
 Salmon River, 211
 Salmon Trout Bay, 577
 Saloupa River, 799
 Sal Point, 172

Sal si Pudes, 33
 Sal si Pudes, Cerro de,
 30
 Saltchidak Island, 496
 Salt Pit Bay, 98
 Salt Pits, 97
 Salt Point, 203
 Samala River, 77
 Samarang Island, 893
 Samarang Islands, 702
 Sanganooda Bay, 503
 Samgar, Strait of, 645
 Samuel Island, 290
 Samuel, Point, 464
 Sanna, 566
 Sandan River, 573
 Sanbon-take, 627
 Sancelito Point, 189
 Sand Island, 238, 868
 Sandon Rocks, 893
 Sandstone Rocks, 301
 Sandwich Islands, The,
 818
 Sandy Island, 394, 748, 901
 Sandy Point, 276, 294, 588
 Sangster Island, 398, 401
 Sannagh Island, 503
 Sannak Island, 503
 Sanson Island, 442
 Sansoral Islands, 784
 Sansum Narrows, 298
 Sant Angel, Fort, 799
 Santiago, 72
 Santiago Bay, 98
 Santiago River, 22
 San Augustine Island,
 753
 — Alessandro Island, 887
 — Andres, 46
 — Andres Point, 47
 — Antonio River, 178
 — Augustino Island,
 887
 — Balardo, Rio de, 172
 — Bartolom, Cape, 458
 — Bartolomé Bay, 146
 — Bartolomé Island, 761
 — Bartolomeo Islands,
 791, 793
 — Benito Islands, 147,
 148
 — Berto Island, 787
 — Blas, 79, 81, 106, 914
 — Bruno Cove, 135
 — Bruno Mountains, 182
 — Carlos, 59, 95
 — Carlos Island, 458
 — Clemente Island, 165,
 166
 — Diego, 149, 915
 — Diego Bay, 155-6
 — Diego Castle, 94
 — Diego, New, 167
 — Diego, Port and Bay,
 150
 — Dionisio Island, 887
 — Engenio Point, 147
 — Estevun, 130
 — Estevan Island, 430

- San Felipe, 11
 — Felipe de Jesus, 133
 — Francisco, 182, 190,
 915
 — Francisco Bay, 149,
 152
 — Francisco Island, 137
 — Gabriel Bay, 137
 — Gerardo, 172
 — Geronimo Island, 149
 — Gregorio River, 180
 — Ignacio, 146
 — Ignacio Point, Island,
 & Bay, 125
 — Inez, Sierra, 163
 — Jacinto Mountain, 472
 — Jose, 3, 72
 — Jose Bank & Id., 6, 8, 9
 — Jose, Cupe, 32
 — Jose del Cabo, 136
 — Jose del Cabo Bay,
 139
 — Jose de Guatemala, 75
 — Jose Fort, 799
 — Jose Island, 329
 — Jose Islands, 26, 333
 — Jose Point, 187
 — Jose, Port, 73
 — Jose Rock, 13
 — Josef Bay, 363, 373
 — Josef Island, 137
 — Juan Capistrano, 168
 — Juan del Sur, 43-4
 — Juan Island, 273, 291,
 293
 — Juan Nepomuceno,
 137
 — Juan, Rio, 18
 — Juan River, 45
 — Juan Rock, 17
 — Juan, Port, 314, 316
 — Juanito, 105
 — Lazaro, 142
 — Lazaro, Cape, 147
 — Lazaro Peak, 139
 — Lorenzo, 56, 95
 — Lorenzo Point, 137
 — Lorenzo, Port, 215,
 349
 — Lorenzo, Rio, 123
 — Lorenzo, Puerto de,
 26
 — Lucas Island, 37
 — Lucas Bay and Cape,
 140
 — Lucas, Cape, 869, 915
 — Lucas Islands, 170
 — Luis D'Apra, Port, 800,
 801
 — Luis Obispo, 172, 176
 — Luis Point, 173
 — Luis Roy, 158
 — Marcial, 126
 — Marcos Island, 134
 — Martin, Cape, 175
 — Mateo Bay, 331
 — Miguel, 8, 61, 63
 — Miguel Bay, 6
 — Miguel Chimalapa, 84
 San Miguel Gulf, 9, 911
 — Miguel Island, 171
 — Miguel River, 65
 — Miguel Point, 150
 — Miguel Volcano, 53
 — Miguel, Volcan de, 66
 — Nicolas Island, 165,
 168
 — Pedro Bay and Hill,
 159
 — Pedro, Cape, and Port,
 33
 — Pedro Island, 28, 103,
 791
 — Pedro Martyr Falls,
 73
 — Pedro Nolasco, 172
 — Pedro Point, 182
 — Pedro River, 112
 — Quentin, Port, and
 Cape, 149
 — Ramon Bay, 150
 — Roque Island, 146
 — Roque, Rio de, 233
 — Salvador, 2, 63, 166
 — Salvador, City of, and
 Volcano, 67
 — Salvador, Coast of, 64,
 68
 — Sebastian River, 202
 — Sebastian Vizcaino
 Bay, 147
 — Simeon Bay, 174
 — Vicente, 63
 Santa Ana, 11
 — Anna River, 160
 — Barbara Town and
 Light, 162
 — Barbara and Channel,
 154, 159, 161
 — Barbara Channel and
 Islands, 164, 168
 — Catalina, 158
 — Catalina Island, 165,
 166
 Sta. Clara, 892
 Santa Clara and River, 161
 — Clara, Rio de, 130
 — Cruz, 90
 — Cruz and Fort, 800-1
 — Cruz Island, 169
 — Cruz Island & Point,
 28
 — Cruz de Mayo, 125
 — Cruz Point and Har-
 bour, 177, 179
 — Inez, 172
 — Inez Island, 130
 — Lucia Bay, 84
 — Lucia, Sierra de, 175
 — Margarita, Cape, 215
 — Margarita Island, 140,
 141-2
 — Maria Bay, 144
 — Maria Point, 148
 — Marina Point, 141
 — Rosa Bank, 817
 — Rosa Island, 170, 788
 — Rosa Shoal, 798
 Santa Sabina Bay, 130
 — Teresa, Barra de, 83
 — Teresa Point, 135
 Santo Domingo Point, 145
 Santo Tomas Island, 787
 Sapon Island, 866
 Sarah Anna Island, 699
 Sarah Point, 465
 Saranac Island, 344
 Sarannaia Cove, 513
 Saratoga Spit, 633, 640, 642
 Sarcophagus Island, 542
 Sardines, Bay of, 174
 Sariguan Island, 811
 Sarpan Island, 803
 Sarytscheff, Cape, 505-6
 Sarytscheff Peak, 504
 Sasagota Bay, 646
 Satanna, Cape, 515
 Satano Misaki, 598
 Satawal Island, 762
 Satchet Head, 259
 Satellite Channel, 295, 297
 Satellite Pass, 329, 334
 Satellite Reef, 389
 Saturna Island, 280, 288,
 290, 377, 387
 Savary Island, 405, 409
 Sawyer Bank, 52
 Sayanagi, 609
 Saypan Island, 794, 805, 807
 Scarborough Hill, 241-2
 Scarborough Island, 716
 Scarborough Islands, 707,
 877
 Schischkoff, Cape, 656
 Schischmareff Strait, 724
 Schischmareff Inlet, 529
 Schooner Pass, 424
 Schouten Island, 780
 Schouten Islands, 778
 Schumagin Islands, 499, 502
 Scotch Fir Point, 402
 Scott, Cape, 326, 372, 373
 Scott Cape, Channel, and
 Islands, 424
 Scott Island, 301
 Scroggs Rocks, 319, 320
 Seylla, Rocks of, 791
 Seabock Island, 265
 Sea Egg Rocks, 401
 Sea Lion Island, 634
 Sea Lions Island, 621
 Sea Lion Rock, 518
 Seal Rock, 147, 254
 Seal Rocks, 185, 398
 Sea Mew Islands, 511
 Sea Otter Cove, 373
 Sea Otter Island, 534
 Sea Otter Rock, 342
 Sea Otter Sound, 458
 Seattle, 260
 Sebastian Lopez Island, 875
 Secas Islands, 25
 Secretary Island, 308, 317
 Seduction Point, 465
 Sechelt Arm, 401, 404
 Segouam Islands, 511
 Sei Sima, 609

a Bay, 130
Barra de, 83
Point, 135
ago Point, 145
Island, 787
d, 886
Island, 699
465
nd, 344
ove, 513
it, 633, 640, 642
Island, 542
ay of, 174
land, 811
nd, 803
Cape, 505-6
Peak, 564
y, 646
pe, 515
ki, 598
nd, 762
nd, 259
annel, 295, 297
es, 329, 334
ef, 389
land, 280, 288,
387
nd, 405, 409
nk, 52
609
nd, 794, 805, 807
h Hill, 241-2
h Island, 716
h Islands, 707,
F, Cape, 656
reff Strait, 724
roff Inlet, 529
Pass, 424
Island, 780
Islands, 778
n Islands, 499, 502
Point, 402
e, 326, 372, 373
pe, Channel, and
424
nd, 301
ocks, 319, 320
ocks of, 791
Island, 265
Rocks, 401
Island, 634
Island, 621
Rock, 518
t, 147, 254
ks, 185, 398
Islands, 511
Cove, 373
Island, 534
r Rock, 342
r Sound, 458
260
h Lopez Island, 875
ands, 25
y Island, 308, 317
n Point, 465
Arm, 401, 404
Islands, 511
a, 609

Seliaple Island, 765
Sémenoff, Cape, 552
Semialino Bay, 269, 378,
380
Semisopchnoi Island, 515
Semitsch Island, 504, 516
Séniavine, Cape, 519, 576
Séniavine Islands, 743
Séniavine Strait, 539
Senora, Province of, 123
Senora and Senorita Islands,
9
Sentinela Island, 20
Sentinel Island, 292
Separation Point, 283, 298
Sequalchin River, 223
Sequeira Islands, 734
Seraki, Cape, 651
Sergheeff Isthmus, 513
Serdze Kamen, Cape, 499
Serdze Kamen Mountain,
545
Serioushe Shoal, 94
Scriphos Rock, 891
Serpent Islands, 728
Sesga Point, 41
Seshart Channel, 337
Setel Island, 898
Seto Uchi, 596, 601, 614
Setuahal Island, 762
Seven Islands, 752
Seven Mountains, Island of,
515
Sovernaia Guba, 574
Savarny Islands, 533
Sevilla, Isla, 28
Seward Roads, 870
Seymour Bay, 900
Seymour Canal, 462
Seymour Narrows, 411-12
Shadwell Passage, 420-22
Shag Rock, 9, 188, 338
Shah Bay, 899
Shakoff Point, 560
Shalers Island, 859
Shangoi Islands, 437, 443
Shantar Islands, 567, 572
Shantarski Islands, 572
Shanz Islands, 728
Shark Pass, 334
Shark Reef, 282
Shark Reefs, 342, 347
Sharp Point, 341, 346, 389,
390
Sharon, 553
Shaw Island, 286, 279, 282,
284, 293
Shell Island, 420
Shelter Arm, 346
Shelby Bay, 591
Shelter Cove, 205
Shelte Island, 365
Shelter Islands, 340
Shelter Point, 397
Shellocks Island (?), 859
Shepherd Mountain, 397,
401
Sherringham Point, 316
Shiashkotan Island, 564

North Pacific.

Shilka River, 584
Shilo River, 588
Shika-no-se, 610
Shimo Idzumi, 667
Shimonosaki, 603
Shingle Point, 360, 421
Shingle Spit, 396
Ship Channel, 340
Ship Island, 329, 333, 334,
337
Ship Passage, 332
Ship Point, 394
Ship Rock, 131, 366, 510
Shipunskoi, Cape, 554, 556
Shirinky Island, 562
Shishaldin Mountain, 506
Shoal Bay, 282
Shoal Channel, 400
Shoal Islands, 299
Shoal Point, 575
Shoalwater Bay, 235
Shoalwater Bay and Cape,
242
Shode Sima, 609
Shovel Island, 859
Shushartie Bay, 421
Shute Passage, 295
Shute Reef, 297
Siau Wuhu Bay, 589
Siclat Point, 93
Sidney Channel and Island,
287, 294
Sidney Island, 288, 289, 296
Sierpe, Boca, 34
Sierra Madre Mountains, 43
Sigak, Cape, 509
Siga Sima, 666
S. Ignacio de Agana, City
of, 801
Signal Head, 673
Sihuantanejo, Port, 97
Sikhs River, 223
Sikine, 626
Sikok, 600, 615
Sikok Island, 596
Sikolan Island, 566
Sikok Strait, 597
Silla Island, 25
Simabara Gulf, 680
Sima, Cape, 621
Simago Islands, 893
Simidin Island, 502
Simidzu Harbour, 623
Simoda, 594, 632, 636
Simoda Harbour, 634
Simonanba Point, 606
Simonoseki Channel, 597
Simonoseki Strait, 601, 602,
605, 665
Simpson Fort, 449
Simpson Islands, 707
Simpson, Port, 433
Simpson River and Fort,
433-4
Sinusir Island, 565
Sinagawa, 642
Sinanomies River, 265
Sinaloa, Province of, 123
Sinaloa, Rio de, 125

Sinclair Island, 268
Sineko, Cape, 656
Sintalapa River, 1, 76
Sio Saki, 615
Siquantanejo, 97
Sirahama, 634
Sirakami, Cape, 651, 655
Sirasai Saki, 616, 617
Siretoko, Cape, 577, 654
Sir Francis Drake's Bay,
196
Siriya Saki, 647
Siro Sima, 602, 675, 687
Sisiki Saki, 669
Sisters, The, 669
Sisters, Islands, The, 276,
339, 398
Sisters Rocks, 99, 296
Sisuro Point, 587
Sitka, 446, 448
Sitka Archipelago, 466
Sitka Islands, 449
Sitka Sound, 472
Sitkin Island, 514
Sitkin, West, 516
Sitziwura Bay, 680
Sivoutchi Island, 534
Sivoutchy Rock, 518
Siwokubi, Cape, 647, 651
Siwo Misaki, 619
Siwu Sima, 893
Sixty-four fathoms Bank,
875
Six Islands, The, 716
Sizikuts, Cape, 603
Sizi Sima, 609
Skenesi Bank, 610
Skidegate Channel, 441
Skidegate Channel and Har-
bour, 437-8
Skina River, 433
Skipjack Island, 280
Skiton Harbour, 442
Slate Island, 450
Slavianska River, 155, 194,
202
Slavianski Bay, 588
Sledge Island, 527
Simpson Reef, 415
Slip Point, 254
Small Island, 366
Smith Inlet, 426
Smith Island, 274, 326, 631,
716, 720, 725, 791
Smith's Island, 131
Smith's River, 213
Smoky Bay, 497
Smotz ura Bay, 616
Snag Point, 241
Snarcs, The, 564
Snettisham, Port, 462
Snug Basin, 331
Snug Corner Bay, 484
Snug Cove, 399
Snug Creek, 298
Soconusco District, 72
Soconusco Province, 77
Socorra Island, 787
Socorro, Puerto del, 269

- Solomonoff, Cape, 576
 Solander Island, 366
 Solentiname, 48
 Soleny Island, 513
 Sombrerito Hill, 134
 Sombrero Point, 31
 Sombrio River, 317
 Somoshiri Island, 654
 Sonate Island, 48
 Sonora, 114
 Sonsonate, 3
 Sonsonate Roads, 68
 Sooke Inlet, 317
 Soonghe Island, 761
 Sophia Point, 469
 Sorivi Saki, 651
 Sorol Islands, 766
 Sosanjaya, 803
 Sosanlago, 803
 Sosan Hagno, 803
 Sosan Haya, 803
 Sotoan Island, 755
 Sotoan Islands, 757
 Sotochirase Rock, 673, 679
 Solima River, 520
 Soumaye, 801
 Saunders Island, 874
 Southampton Rock, 634
 South Bay, 246
 Southey Point, 301, 308
 Southgate River, 410
 South Island, 628, 879
 South or Perry Island, 886
 South Rock, 902
 South Rowan Island, 800
 Southworth Point, 261
 Souvoroff and Cape, 520
 Souworoff Islands, 725
 Soya, Cape, 579
 Soya Island, 657
 Sozu Sima, 609-10
 Spanberg, Cape, 543, 562, 654
 Spanberg Island, 566
 Spanberg Mountain, 576
 Spanish Bank, 385
 Spanish Islands, 817
 Speaker Rock, 415
 Speck Reef, 55
 Spencer, Cape, 469-70
 Spencer Keys, 769
 Spencer Ledge, 325
 Spencer Point, 528
 Spex Strait, 669, 685
 Sphinx Island, 306
 Spieden Chan., Directions, 292
 Spieden Island, 279
 Spieden Island and Channel, 292
 Spirkin Islands, 508
 Spring Passage, 279
 Sproat Bay, 330
 Square Rock Point, 664
 Squawmish River, 398
 Squirrel Cove, 406
 Srednoy Island, 565
 Stachinski Inlet, 455
 Stag Bay, 405
 Stamp Harbour, 331-2
 Stanhope Point, 455
 Staniforth Point, 430
 Stanski Point, 558
 Stanovoi Mountains, 537
 Stapleton Island, 880, 884
 Starbuck Island, 706
 Staritchkoff Reef, 513
 Starlight Reefs, 340
 Station Peak, 149
 Steamer Bay, 455
 Steamer Cove, 346
 Steamer Pass, 331
 Stearns Bluff, 247
 Steep Cape, 495
 Steep Island, 412
 Steep Point, 284
 Steep-to Island, 724
 Steilacoom, 262
 Stephen Islands, 780
 Stephens, Cape, 524
 Stephens Islands, 431
 Stevens Passage, 401, 459, 460, 461, 462
 Sterile Island, 494
 Sterile Bay, 341
 Sterile Port, 451, 589
 Stevane River, 461
 Stikine River and Fort, 454
 Stobual Island, 722
 Stockdale Harbour, 487
 Stockade Point and Bay, 286
 Stolbovoi, Cape, 553
 Stobovskaia River, 553
 Stolétié, Cape, 542
 Stone Mole Rocks, 527
 Stopper Islands, 339, 340
 Storm Island, 334, 338, 424
 Strawberry Bay, 268
 Striped Peak, 254
 Strogonoff Bay, 656
 Strogonoff, Cape, 519
 Strong Island, 739
 Strong Tide Island, 325
 Stuart Channel, 299, 307
 Stuart Island, 280, 288, 291, 409, 524
 Stuart Island and Channel, 287
 Stubbs Island, 342
 Sturgeon Bank, 378, 385
 Styleman Point, 462
 Stuart Island, 279
 Suchiltepeques Province, 77
 Sucia Island, 277, 280
 Suckling, Cape, 481
 Suco Island, 898
 Suemez Island, 458
 Suffrein Bay and Cape, 581
 Sugarloaf Cape, 532
 Sugarloaf Island, 207, 898
 Sui-tun River, 588
 Sukhtelen Bay, 656
 Suk Island, 761
 Sullivan Reefs, 363
 Sullivan Point, 459
 Sulphur Bay, 789
 Sulphur Beds, 163
 Sulphur Island, 887, 894
 Sulphur Peak, 155
 Sulphur Rocks, 13
 Sului Sima, 643
 Sumass River, 332
 Sumegi Lake, 634
 Sumshu Island, 562
 Sunday Rock, 348
 Sung-ami, 617
 Sungari River, 585
 Sunharon, 807
 Supply Rock, 634
 Sugumish Harbour, 265
 Surf Islands, 368
 Surge Islands, 365
 Sur Point, 175
 Suruga, Gulf of, 622, 636
 Susaki, 601, 632, 634, 639, 643, 645
 Susa Maria, 146
 Susan, Port, 265
 Susquehanna Bay, 640
 Sutil Channel, 406, 408-9
 Sutil Mountain, 307
 Suwo Kubi, Cape, 649
 Suwo Nada, 605
 Suzume Rock, 675
 Sveno Yama Mountains, 644
 Svetchnikoff Harbour, 512
 Swaya Point, 602
 Swaine, Cape, 428
 Swain Reef, 667
 Swale Rock, 337
 Swans, Bay of, 572
 Swanson Channel, 287, 296, 301, 304, 305
 Swars, Cape, 654
 Swede Islands, 762
 Swiss Boy Island, 334-5
 Sybilla Island, 791
 Sybilla Bay, 591
 Sydenham Island, 713
 Sydney Inlet, 345-6
 Sydney Islands, 404
 Sykes, Point, 450
 Sympiegades Islands, 682
 Taba Sima, 606
 Table Bluff, 208
 Table Hill, 897
 Table Island, 362
 Table Mountain, 195, 686
 Table Point, 590
 Tables Mountains, 150
 Taboga, 11
 Taboga and Island, 14
 Taboga Rocks, 13
 Tabognilla, 14
 Tabor Island, 15
 Tabu Sima, 657
 Taco and Arm, 462
 Tagai Islands, 725
 Tagaik Island, 761
 Tagh Kiniagh Island, 502
 Tagleokou Mountain, 539
 Tago Bay, 623-4
 Tagoilap Island, 765
 Tagua Point, 802

- 163
 887, 894
 155
 13
 332
 334
 562
 348
 585
 334
 rbour, 265
 68
 365
 of, 622, 636
 32, 634, 639,
 46
 65
 Bay, 640
 406, 408-9
 n, 307
 n, 649
 68
 675
 Mountains, 644
 Harbour, 512
 602
 428
 587
 337
 of, 572
 nnel, 287, 296,
 65
 654
 s, 762
 land, 334-5
 d, 791
 591
 land, 713
 t, 345-6
 ada, 404
 450
 Islands, 682
 306
 208
 397
 l, 362
 tain, 195, 686
 590
 ntains, 150
 Island, 14
 ks, 13
 14
 d, 15
 657
 rm, 462
 ds, 725
 nd, 761
 gh Mountain, 502
 Mountain, 539
 323-4
 land, 765
 t, 802
 Tahaharce Bay, 616
 Tahaurawo, 844
 Tahooru Island, 856
 Tah-sis Canal, 351
 Tah-sish Arm, 361
 Ta Island, 751
 Taigonotskoi, Cape, 569
 Taipingon Point, 803
 Taitchnoi, Cape, 513
 Tai-pin-san Islands, 899
 Tajamulco Volcano, 74
 Takaboko, 676
 Taka Islands, 718, 725
 Takakama Island, 808
 Takain Rock, 745, 746
 Takamatsu, 609
 Takami, 608
 Takanaba Island, 600
 Taka Sima, 616, 674, 682
 Taka Sima Islands, 682
 Takayama, Cape, 664
 Takay Island, 742
 Take Sima, 891
 Taking Island, 899
 Tako River, 463
 Takura Saki, 614, 616
 Tala Point, 264
 Talawa, Lake, 214
 Talon Island, 20
 Tamagawa, 663
 Tamana Island, 711
 Taman Island, 746
 Tama no Ura, 672
 Tamarinda, 47
 Tamary Aniwa, 577
 Tamasula Hill, 124
 Tamatam Island, 760
 Tamathun, 104
 Tameiti Bay, 680
 Tammatapappa Island, 856
 Tanabe, 617
 Tanabe, Bay and Cape, 618
 Tanaga Island, 514
 Tanapag Harbour, 809
 Tanega Sima, 891
 Tanghinakh Island, 509
 Tungolatungola Island, 88
 Tannadagh Island, 516
 Tano Bank, 604
 Tano-ura, 604
 Tan Saki, 673
 Taongi Islands, 725
 Tapak Rock, 746
 Tapiteuwea Island, 708
 Taputeouea Island, 711
 Tarafoto, 801
 Tarafoto Harbour, Port, and
 River, 802
 Tarakai, 573
 Tarara Island, 900
 Tarawa Island, 708, 715
 Tarcoles Bay, 36
 Tarvinski Harbour, 557,
 560
 Tartary, Gulf of, 580
 Taske Bay, 670
 Tasman Bay, 600
 Tasso Harbour, 442
 Tatauoni Bay, 607
 Tatchik Bay, 526
 Tat-chu Point, 358, 363
 Tatiyama Bay, 633, 639
 Tatnall Reefs, 423
 Tatouch Island, 252
 Tatoosh Island, 252
 Tatsupi Saki, 646, 651
 Tavala River, Great, 123
 Tavano, Port, 566
 Tavasera, Rio, 22
 Ta-wu-hu Bay, 590
 Tehagvan Bay, 522
 Tehaichi Islands, 511
 Tehaplin, Cape, 511
 Tehastie Islands, 514
 Tehetchehouioun, 541
 Tehiarloun Strait, 540
 Tching-an, Cape, 543
 Tehinkitanay Bay, 472
 Tehirikoff, Cape, 544
 Tchoukotskoi, Cape, 541, 544
 Tchuktchis, The, 535
 Teacapan, Boca de, 112
 Tebakh, Cape, 585
 Tebenkoff Cove, 524
 Tebut Island, 729
 Te-cheh-quut, 223
 Tecusitan, 104
 Tehuantepec, Town of, 84
 Tehuantepec, Gulf of, 79,
 82, 912
 Tejupan Bluff, 98
 Tejupan, Point and Paps of,
 110
 Telegraph Harbour, 299,
 301, 309
 Telegraph Hill, 187
 Telica Volcano, 50, 55
 Temo Island, 724
 Templar Channel, 342, 345
 Templar Rocks, 323
 Temposan, Fort, 612
 Tenacatita Bay, 102
 Tenedos Island, 746
 Tennessee (wreck), 193
 Tenola, Barra de, 83
 Tent Island, 300, 301, 308
 Tepec, 106, 109
 Tequepa Point, 96
 Terapa Island, 15
 Tesico, Cape, 566
 Tessan Shoal, 112
 Teurire Island, 657
 Texhuda Island, 391, 397,
 398, 401, 409
 Texupon Point, 913
 Thames Shoal, 324
 Thatcher Passage, 282, 283
 Thetis Cottage, 320
 Thetis Cove, 442
 Thetis Island, 299, 306, 307,
 309
 Thirteen Islands, 764
 Thomas Point, 419
 Thompson Point, 285
 Thompson River, 375
 Thormanby Islands, 401-2
 Thornborough Channel, 40
 Thorn Rock, 442
 Three Hill Island, 630
 Three Hummock Island, 630
 Three Islands, 878
 Three Sisters Islands, 781
 Thumb Peak, 10
 Thurlow Island, 413, 414,
 417
 Tiara Mountain, 575
 Ti-a-usu Island, 903
 Tibbett Island, 629
 Tiburon Island, 130
 Tichenor's Rock, 220
 Tide Island, 407
 TIDES, 924-933; Tides in
 general, 924; Rev. Dr.
 Whewell on the Tides of
 the Pacific, 925; Tides on
 West Coast of North
 America, 927-8; Islands,
 929; Central Pacific, 930.
 Tide TABLE—
 Central America, Mexico,
 &c., 931; British Co-
 lumbia, &c., 932; Alaska,
 &c., 932; Tartary,
 Japan, and the Islands,
 933
 Tides, Active Pass, 305
 — British Columbia, 378
 — Broughton Strait, 417
 — Calm and Bute Chan-
 nels, 411
 — Georgia, Strait of, 391
 — Goletas Channel, 420
 — Haro Strait, 289
 — Honolulu, 852
 — Jervis Inlet, 404
 — Johnstone Strait, 414
 — Nagasaki, 679
 — Nanaimo Harbour, 390
 — Nootka Sound, 351
 — Central Pacific, 930
 — North Pacific, 923
 — Panama, 13
 — Punta Arenas, 38
 — Queen Charlotte's
 Islands, 443
 — Rosario Strait, 276
 — Sandwich Islands, 823
 — San Francisco, 190
 — Seymour Narrows, 41
 — Triacmalie Channel,
 309
 — Vancouver Island,
 326
 Tide Table, 931
 Tierra, Piedra da, 106
 Tierra, Silva de, 23
 Tigalda Island, 606
 Tigalda Island, 506
 Tiger Island, 777
 Tigil River, 568
 Tigilsk, 569
 Tigre, Island of, 58
 Tigre, Rio del, 32
 Tigrino Point, 31
 Tilapa, 76
 Tiloma, 83
 Tiloma Lake, 83

- Tillamook Bay and Head, 230, 231
 Tillamook, False, 231
 Timber Cove, 203
 Tindal and Watts Island, 724
 Tinginak Island, 509
 Tinian Island, 794, 805
 Tinto, Arroyo, 24
 Tiptapa River, 48
 Tisingal Gold Mines, 3
 Titiguapa, Rio, 65
 Tjan Island, 722
 Tlevak Strait, 458
 Tlapana Arm, 350, 353
 Toba Inlet, 406
 Tobi Island, 784
 Tobi Sima, 614, 674
 Todd Rock, 324, 330
 Todos los Santos, 141, 150
 Todos Santos, 173
 Toeigh and Bay, 834
 Toe-yah-yah Bay, 834
 Tofino Inlet, 345
 Tohadgi Point, 634
 Tokara Sima, 893
 Toke Point, 242
 Tokoea, 721
 Tok Sima, 894
 Toledo, 223
 Tol Island, 758
 Tolocolme Mountain, 744
 Tolstoi, Cape, 513
 Tormales Point and Bay, 196, 199
 Tomas Bay, 42
 Tomang-ai Island, 613
 Tomo, 608
 Tomoika Harbour, 681
 Tom Point, 297
 Tomo Sima, 610
 Tongass, 449
 Tongue Point, 142, 308
 Tongue Point and Channel, 240
 Tonin, Cape, 577
 Tonkoy, Cape, 495
 Tonock Bay, 458
 Top-knot Point, 372
 Toporkoff Island, 548, 555
 Toporkowa Island, 494
 Toquart Harbour, 338-9
 Tordillo, Cerro, 128
 Tordila, Rio, 65
 Toriwi saki, 646
 Torres Island, 758
 Torres Rocks, 812
 Tortolas, Rio de los, 209
 Tortuga Bank, 808
 Tortuga Island, 130, 134
 Tortugas Rock, 116
 Torua Island, 722
 Tosco, Cape, 141
 Tosima Island, 600, 623
 Totomosiri Island, 679
 Totten's Inlet, 262
 Touching Island, 717
 Tougouene Point, 799
 Toukura Island, 893
 Toulikakoi & Volcano, 509
 Towaihai Bay, 834
 Tower Bay, 95
 Townsend Point, 460
 Townshend, Port, 257
 Toyama and Bay, 660
 Toyimisaki and Point, 600
 TRADE-WINDS, see WINDS.
 Trading Bay, 492
 Trail Bay and Islands, 401
 Traitor's Cove, 457
 Traitor's Bay, 567
 Traitor's Islands, 780
 Traversey Islands, 722
 Tranquil Creek, 345
 Transfiguration Bay, 543
 Trap Bluff, 362
 Trapiche Peninsula, 8
 Treaty Point, 641
 Tree Island, 301, 878
 Tree Point, 612
 Tree Rock, 676
 Tree Saddle, 632
 Tree Saddle Hill, 643
 Tremeton, Mount, 401
 Tres Columnas Island, 875
 Tres Ojitos, Los, 130
 Trevan Rock, 437
 Trial Island, 320
 Trial Islands, 323
 Triangle Island, 425
 Tribune Bay, 393, 396
 Trincomalie Channel, 287, 291, 306, 307
 Trinidad, 127
 Trinidad Head and Bay, 209
 Trinidad River, 9
 Trinity Cape and Islands, 496
 Trinity River, 211
 Trio Rocks, 892
 Triunfo Silver Mines, 121
 Triunfo de los Libres, 64
 Trollope Point, 450
 Trollope Rock, 6
 Tromelin Island, 766
 Trucha, 21
 Trucha Island, 20
 Truk Islands, 757
 Tschatchanobury Mountain, 567
 Tschegoula Island, 510
 Tschegoula Islands, 516
 Tschiganok Mountain, 510
 Tschikotan Island, 562, 566
 Tschoka River, 573
 Tschipunski, Cape, 554
 Tschirikoff Bay, 502
 Tschitschagoff Bay, 517
 Tschitschagoff, Cape, 520
 Tschitschagoff Islands, 723
 Tschougatschouk Bay, 490
 Tshirinkotan Island, 564
 Tsisia Rock, 579
 Tsis Island, 758
 Tsiuka, Cape, 451, 647
 Tskahara Bay, 616
 Taugar, Cape, 646
 Taugar, Strait of, 645, 652, 655
 Teuji-Sima, 681
 Tsukarase Rocks, 682
 Tauruga and Bay, 663
 Tau Sima, 665
 Tautara Sima, 672
 Tsuya Sima, 620
 Tuam, Mount, 294
 Tucker Bay, 401-2
 Tucker Island, 762
 Tuft Island, 601
 Tugidak Island, 496
 Tugursk Bay, 573
 Tugursk Bay and River, 572
 Tujugiak River, 521
 Tulle Island, 581
 Tuman River, 586
 Tumbo Island, 288
 Tumitas River, 180
 Tumun Point and Bay, 802
 Turnagain Arm, 485
 Turnagain Island and Arm, 492
 Turnbull Reef, 296
 Turner Point and Cape, 477
 Turn Island, 278, 329, 331, 333
 Turn Island, and Rock, 278
 Turn Point, 288, 291, 406, 422
 Turret Rock, 830
 Turtle Back, 285
 Turtle Bay, 146
 Turtles Rocks, 210
 Tusubro River, 35
 Tutomi Gulf, 622
 Twenty-foot Rock, 266
 Twin Island, 306
 Twins Islands, 347
 Two Brothers Reef, 863
 Two-headed Point, 496
 Two Tree Island, 713
 Tyahatoota Bay, 836
 Tye Sima, 898
 Ty-ping-san Island, 900
 Typso River, 247
 Tzartous Island, 323, 339
 Uakkoun, Cape, 543
 Ualan Island, 739
 Ualan Islands, 734
 Uaro Sima, 606
 Ubita Point, 34
 Uchucklesit Harbour, 331
 Ucluelet Arm, 340
 Ucona Rocks, 633
 Udin-Milai Islands, 727
 Udirick Islands, 725
 Udi-i Island, 608
 Udsi Sima, 682
 Ugagouk River, 520
 Ugly Channel, 340
 Ujag Islands, 728

e, 646
ait of, 645, 652,

681
ocks, 682
l Bay, 663
65
na, 672
t, 620
nt, 294
t, 401-2
and, 762
i, 601
land, 496
ay, 573
Bay and River,

River, 521
nd, 581
ver, 586
land, 288
river, 180
Point and Bay,

n Arm, 485
n Island and Arm,

Reef, 296
Point and Cape,

and, 278, 329, 331,
land, and Rock,

int, 288, 291, 406,
Rock, 830
ack, 285
ay, 146
Rocks, 210
River, 35
Gulf, 622
-feet Rock, 366
land, 306
Islands, 347
others Reef, 863
ealed Point, 496
ree Island, 713
toon Bay, 836
ma, 898
g-san Island, 900
River, 247
cos Island, 323, 331

oun, Cape, 543
Island, 739
Islands, 734
Sima, 606
Point, 34
eklesit Harbour, 331
let Arm, 340
a Rocks, 633
-Milai Islands, 727
ick Islands, 725
Island, 608
Sima, 682
ouk River, 520
Channel, 340
Islands, 728

Ujilong Island, 733
Ukinsk Bay, 562
Uki Sima, 644
Uku Sima, 671
Ulak Island, 515
Ulie Islands, 764
Ulithi Island, 766
Ulomna Bay, 803
Ulul Island, 760
Umata, 808
Umata Bay and River, 798,
799

Umpquah River, 226
Unalacheet, 525
Unalaklik, 525
Unawb Island, 767
Union Island, 360
Union, La, 3, 56, 59
Union Telegraph Comp., W.
500, 546

Uniontown, 208
Unit Rock, 288
Unoura Harbour, 661
Unwelcome Harbour, 749
Unwelcome, Port, 744
U du Point, 834
Upright, Cape, 532
Upright Channel, 286
Upright Channel and Hill,
282

Upright Cliff, 301
Upwood Point, 402-3
Uraga Channel, 632, 637,
639, 643-4
Urago Channel, 632
Ura-kami Harbour, 620
Uranie Bank, 761
Ura-no-utsi, 601
Urava Peak, 14
Urricns Islands, 815
Urbitsh, 566
Urukthapel Island, 773-4
Urup Island, 565, 566
Uscloss Bay, 259
Useless Inlet, 335
Ushishir Island, 565
U Sima, 652
Usouri Bay, 589
Usubre River, 35
Usuri River, 585
Utholotakoi, Cape, 569
Utirik Islands, 718, 725
Utiroa, 711
Utoné, 626
Uu, 744
Uwa Sima, 605

Vagares Islands, 42
Vakhilekaia River, 555
Valle de Banderas, 104
Valdes Island, 306, 406,
408
Valdes, Puerto de, 485
Vali, Corro, 8
Valientes Islands, 752
Valladolid Rock, 15
Vallenar Point, 452
Vancouver Bay, 404
Vancouver, Cape, 522

Vancouver Island, 251, 271,
311, 326, 918
Vandalia Bluff, 634
Vandeput Point, 461
Van der Lind, Cape, 566
Van Dieman Strait, 598,
635, 921
Vansittart Island, 422
Vargas Cone and Island, 341
Vargas Island, 347
Variation of the Compass,
952

Vasilova Rock, 473
Vashon Island, 259
Vashon Point and Island,
261
Veevidovskai Islands and
Cove, 509
Veevidovskoi Volcano, 509
Vela Rocks, 889
Velas, Cape, 39
Velasquez Island, 57
Venado Island, 16, 114
Venados, Islas de los, 113
Ventana Island, 26
Ventana Point, 21
Ventosa Bay, 83
Venus Shoal, La, 142
Veragua, 3
Veragua, Coast of, 912
Veragua Mountains, 11
Veragua, Province of, 16
Verkhotoursky Island, 547,
552
Vermilion Sea, 112, 122
Vernon Bay, 337
Vesuvius Bay, 301
Vicente Point, 159
Victoria Harbour, 297, 319,
322
Victoria, La, 167
Victoriense Island, 893
Victoria, Mount, 404
Viejo, Volcan de, 52, 53
Vigia Grande, 99
Vigia Hill, La, 162
Vigilant Point, 412
Village Island, 336, 362
Village Pass, 339
Village Point, 394
Village Rocks, 335
Villeuchinski Mountain, 557
Villeuchinski Volcano, 554
Viner Point, 408
Vineta Rock, 686
Violin, Pta., 34
Vique Cove, 15
Viradores Islands, 40
Virago Rock, 308
Virago Sound, 439, 440
Virginas Paps, Las, 140
Virginie Mountain, 538
Virgin Rocks, 426
Viuda, 26
Viuda Rock, 25
Viveros Island, 7
Vneshnei, Cape, 571
Vovoda Bay, 569
Volano Island, 27

Volcano Bay, 655
Volcan Island, 875
Volcano Hill, 844
Volcano Island, 627, 886,
891, 893
Von Donop Creek, 407
Vouten River, 542
Vries Island, 625, 643
Vulcan Island, 778

Wadasima Harbour, 615
Waddington Harbour, 410
Wafer Bay, 696
Waiakea Bay, 828
Waiakea Point, 831
Wainai Harbour, 846
Waikiki Anchorage, 852
Wailoli Mountain, 853
Waiatua District, 846
Wailuku River, 829
Waimanalo, 847
Waimanolo Point, 848
Waimanu Valley, 833
Waimea Bay, 847-8, 853
Waimea District, 834
Waisima Bay, 661
Wakasa Bay, 663
Wakayama, 614, 616
Wakonnenish Island, 342
Wakes Island, 792, 877
Walalla River, 203
Walckenaer Bay, 779
Waldron Island, 279, 294
Wales Island, 449
Wales Point, 434
Walker Bay, 880, 884
Walker Cove, 451
Walker Hook and Rock,
307
Walker Islands, 423, 697
Walker Point, 427
Walmouth Hill, 274
Walpole Point, 461
Walvis Bay and Islands,
567
Waneka District, 745
Wappatoo Island, 230
Warle Point, 454
Warn Bay, 344
Warn Island, 345
Warren Hastings Island,
783
Warren Island, 457
Wasaki, 658
Washington Harbour, 255
Washington Island, 435,
701
Washington, Mount, 395
Washington Territory, 242,
269, 379
Wasisu yama, 661
Wasp Islands, 279, 284
Wasili-off Bay, 501
Watauski, Cape, 591
Waterfall Creek, 829
Waters Point, 486
Waxell, Cape, 518
Webster Island, 641
Wedge Head, 620

Wedge Island, 101, 370, 453
 Wedge-shaped Cape, 606
 Weeks Island, 876
 Weewodski Harbour, 460
 Wellington Islands, 742
 Weziloffsky, Cape, 507
 Westcott Creek, 293
 Westervelts Islands, 756
 Westminster, New, 272, 382
 West Point, 260
 West Rocks, 360
 West Sound, 285
 Weynton Passage, 417, 418
 Whale Bay, 475
 Whale Channel, 132
 Whale Creek, 231
 Whale Fishery, 501
 Whaleman Anchorage, 700
 Whale Rock, 320, 321
 Whale Rocks, 277
 Whaler Island, West, 347
 Whaley Point, 461, 663
 Whidbey Islands, 261, 269, 265-6
 Whiffin Island, 317
 Whil-a-pah River, 244
 White and Black Rocks, 275
 White Beach Bay, 286
 White Cliff, 282
 White Cliff Bay, 588
 White Cliff Head, 360, 362
 White Cliff Point, 399
 Whitehorn Point, 276, 377
 White Island, 99, 401, 405
 White Pine Cove, 347
 White Rock, The, 279, 299, 300, 424, 669
 White Rock Point, 617
 White Rocks, 174
 Whitestone Point, 371
 White Spit, 309, 394
 Whitshed Bay, 604
 Whymea Bay, 843
 Widow Rock, 25
 Wilder Bay, 689
 Wilfred Point, 412
 Willamette River, 241
 Willes Island, 422
 Willes Harbour, 869-70
 William Head, 319
 William Point, 268
 William the Fourth Islands, 751
 Willow Point, 411, 412
 Wilson Island, 601, 605, 791
 Wilson Islands, 763
 Wilson Point, 257
 Wimbledon Point, 469
 Winchelsea Island, 392
 Winchester Bay, 227
 Winchester Mountain, 688
 Windham Point, 462
 WINDS of the North Pacific, 907-924, The General Arrangement, 907, Limits

of the Trade-winds, 909;
 Calm Belt, 909; N.E.
 Trade-wind, 910; S.W.
 Anti-Trade or Passage
 Winds, 910; Central Ame-
 rica, 911; Guayaquil
 River to Guasacames Point,
 911; Choco Bay, 911;
 Chirambira Point to Gulf
 of San Miguel, 911; Pa-
 nama, 912; Gulf of
 Dulce to Gulf of Fonseca,
 912; Gulf of Fonseca to
 Gulf of Tehuantepec, 912;
 Gulf of Tehuantepec to
 Texupan Point, 913; W.
 Coast of Mexico, 914;
 Lower California, 915;
 Cape San Lucas to San
 Diego, 915; California,
 916; San Francisco, 917;
 Vancouver Island, Alas-
 ka, &c., 918; Behring's
 Sea, 920; Kamchatka,
 920; Japan, 921; The
 Islands, 923
 — California, 164
 — Caroline Archipela-
 go, 737
 — Central America, 4
 — Gulf of Tartary,
 580
 — Hawaiian Archipe-
 lago, 822
 — Ladrone Islands,
 797
 — North Pacific, 907
 — San Francisco, 193
 — Vancouver Island,
 314
 Wingham Island, 482
 Winter Cove, 290
 Winter Harbour, 370
 Wise Island, 304
 Wishart Reef, 754
 Witshed, Cape, 483
 Woahoo, 818
 Woahoa Island, 846
 Wodehouse Point, 473
 Wolea Islands, 764
 Wolf Island, 317
 Wolf Rock, 458
 Wooden Rock, 464, 467
 Wood Hill, 897
 Wood Islands, 344
 Woodie Island, 707, 714
 Woolridge Island, 400
 Woody Island, 495
 Woody Point, 327, 365
 Worlcombe Island, 400
 Works Canal, 433
 Woronzow Point, 492
 Worraray Mountain, 827
 Wo Sima, 682
 Wotje Islands, 722-3
 Wotho Islands, 728
 Wrangel Island, 454
 Wreck Bay, 341
 Wukido Island, 894
 Worst, Cape, 575
 Wu-sima, 608
 Wu-sima Channel, 607
 Wyadda Island, 253
 Xicalapn, 77
 Xima, Cape, 621
 Ximotepe, 47
 Xipanga, 693
 Yablonoi Krebit Mountains,
 584
 Yafiko yama, 660
 Yakima Pass, 260
 Yakual or Yuquot Sound,
 349
 Yukuno Sima, 891
 Yale, 376, 381
 Yama Kama and Harbour,
 599
 Yam Bay, 855
 Yang-tse-kiang, 683
 Yanikinson, 639
 Yaniskossery Island, 657
 Yap Island, 767
 Yaqui, 129
 Yaqui, Rio, 126, 138
 Yaquinnah River, 228-9
 Ya saki, 658
 Ya sima, 606
 Yaska Island, 460
 Yebiau, 659
 Yebosi sima, 666
 Yedo, 636
 Yedo Bay, 640, 642
 Yedo Bay and Gulf, 921
 Yedo, Gulf of, 622, 632,
 642
 Yei Bay, 610
 Yirabu Sima, 894
 Yellow Bluff, 418
 Yellow Island, 284, 297,
 393
 Yellow Point, 300
 Yeno, 608
 Yeno Sima, 670
 Yeo Island, 392
 Yerabu Sima, 891
 Yerba Buena, Cove of, 183
 Yerba Buena Island, 189
 Yerghin Shoal, 340
 Yer-ra-bu, 900
 Ye saki, 610
 Yosan, Cape, 647
 Yeso, 634
 Yeso Island, 645, 653
 Yetomo, Cape, 655
 Yeterop Island, 666
 Yew Point, 321
 Yezo Island, 578, 596
 Ykima Island, 900
 Ykitak Island, 668
 Ykolik, Cape, 496
 Ynurajan Bay, 803
 Ynes, Punta, 134
 Yobuko, 686
 Yobuko Harbour, 668

INDEX.

1007

Cape, 575
 , 608
 Channel, 607
 Island, 253
 , 77
 Cape, 621
 e, 47
 , 593
 i Kribit Mountains,
 ama, 660
 Pass, 260
 or Yuquot Sound,
 Sima, 891
 6, 381
 ama and Harbour,
 y, 855
 e-kiang, 683
 non, 539
 esery Island, 657
 and, 767
 129
 Rio, 126, 138
 nah River, 228-9
 , 658
 t, 606
 Island, 460
 659
 sima, 666
 36
 ay, 640, 642
 ay and Gulf, 921
 Gulf of, 622, 632,
 y, 610
 u Sima, 894
 Bluff, 418
 Island, 284, 297,
 Point, 300
 308
 Sima, 670
 land, 392
 i Sima, 891
 Buena, Cove of, 183
 Buena Island, 189
 in Shoal, 340
 -bu, 900
 i, 610
 Cape, 647
 634
 Island, 645, 653
 o, Cape, 655
 op Island, 666
 Point, 321
 Island, 578, 596
 a Island, 900
 t Island, 668
 k, Cape, 496
 an Bay, 803
 Punta, 134
 ko, 686
 ko Harbour, 668

Yodo-ngawa River, 611
 Yodsibi Rock, 603
 Yoka Sima, 668
 Yoko, 607
 Yokohama and Bay, 641
 Yokoiso, Cape, 646
 Yoko Sima, 893
 Yori Sima, 895
 York, Cape, 529
 Yosino, 609
 Yosino Bluff, 610
 Youchin, Cape, 548
 Younaska Island, 510
 Young's Pt., 228, 401, 463
 Young's River, Point & Bay,
 239

Young's Bay, 239
 Youp-nut River, 529
 Ystapa, Morro de, 85
 Yukon River, 523
 Yule Island, 364
 Yuma, Fort, 131
 Yura and Fort, 613
 Yura No Uchi, 617
 Yuri, 606, 661

Zacatula River, 97
 Zadan, Cerro de, 87, 90
 Zakharovskaya Bay, 503
 Zapatera, 48
 Zapote, 48, 75

Zarembo Island, 455
 Zarpane Island, 803
 Zavalichine, Cape, 744
 Zayas, Ido de, 443
 Zealandia Rocks, 811
 Zeballos Arm, 358
 Zedzones Islands, 28
 Zero Rock, 287, 289
 Zipegua, Punta de, 85
 Zoga Saki, 616
 Zonzonate, 68
 Zouboff Islands, 533
 Zuciarte Channel, 353
 Zuniga Point, 149, 150
 Zuniga Shoal, 156

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